JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

Annual Meeting of the Institution.

GLASGOW is going to give the members of the Institution a royal welcome on the occasion of the annual meeting to be held under the presidency of Mr. Alexander Wilson, M.Inst.C.E., the respected Engineer to the Corporation. No one would expect otherwise of the commercial and industrial Metropolis of Scotland. To heartily welcome to the city organizations devoted to technical, industrial, and commercial progress is in perfect consonance with the vitality and activities that have made the city and its people what it is and they are. The members will feel honoured by the magnanimity of the support that is being extended to their President by the Lord Provost (the Hon. A. M'Innes Shaw), the Convener (Bailie Paxton) and the members of the Gas Committee, and the members of the Corporation generally, and, further, by the generosity of the arrangements they have collectively made for receiving the central technical organization of the gas industry. The programme received by the members at the end of last week will have informed them as to the nature of these liberal arrangements; and it will also have shown them how these arrangements and the more prosaic—although pregnant with interest and importance—part of the programme planned by the Council of the Institution, provide for a very full week. If the programme is followed through with the diligence that it deserves, there will be very little spare time during the days to be spent in the city. Given fine weather, it should be a meeting with many happy recollections, and with valuable results for the technical and commercial interests of the industry.

The technical part of the programme was referred to in these columns on May 16; and there is nothing to add to the forecast of a highly profitable gathering in this connection. There is an addition however, which was not then noticed; and it is the lecture on "Surface Combustion" by Professor W. A. Bone, with experiments. Those who read the two lectures that Professor Bone recently delivered at the Royal Institution (as reported in our columns) will look forward with interest to not only hearing from the lecturer's own lips the results of his past eight or nine years' work (in collaboration with Mr. M'Court and others), but to witnessing the exposition by actual apparatus of the present and prospective value of these results. Those who were present at the Royal Institution can promise those who were not that they will be well rewarded by devoting the evening of Tuesday to the lecture and demonstration.

Report of the Council.

THE report that the Council will present at the meeting is not such a bald document as certain of its predecessors; and it indicates an excellent amount of internal activity, though apparently for positive results in most respects we must still possess our souls in patience. The Institution, however, in many of the activities in which the Council are engaged, are merely parties to the work that is being done, and they cannot independently hurry forward the conclusions. But in its corporate capacity and activities, the Institution would, we are fully persuaded, be a more influential organization if it were really representative, not only of the technical work of the industry, but of its financial and commercial interests—a subject which was so broadly treated upon in the address to the members by the ex-President (Mr. James W. Helps). Whether anything will result from the plea for the revision of the constitution of the Institution, and for a broadening of its bases of representation and work, cannot at the moment be definitely said, inasmuch as the Committee who were appointed to consider the subject find that it is not yet possible to present a report such as was indicated in the resolution referring the subject to them. There is to be further consideration; and therefore we will not discuss probabilities. But we would, meantime, express the hope that the ultimate result will prove the strength of the gas-engineering profession, and the desire of the members of the profession to see a vigorous central organization established comprehending the entire interests of the gas industry. It would be a palpable confession of sorry weakness and nervousness if gas engineers as a body opposed from the fear that, in doing the right thing in the interests of the gas industry, the pressure of the throng would keep them from still appearing well in the front. We do not think the position of the gas engineer is so insecure as some engineers—unintentionally, perhaps, but any way it is not self-complimentary—would appear to make out. But this is a side of the question that touches the ultimate decision of the Committee; and it is hoped that there will be no occasion to dilate upon it when the report of the Committee sees the light of day.

Closely allied to this matter is that of the Publicity Committee. Substantial support has been received; but, as the result of the recent conference, there are two or three questions still outstanding for settlement. It is to be hoped that one of these was finally composed at a conference of municipal authorities held at Salford yesterday, through the active interest that Alderman F. S. Phillips, the Chairman of the Corporation Gas Committee, is taking in the subject. The Provisional Publicity Committee (the membership of which is constituted of many more than members of the Council of the Institution) are anxiously desirous of seeing the movement amply financed as early as possible, so that the machinery can be put into energetic operation.

The contents of the report embrace much of common knowledge. Beyond, information is given that there will be reports presented at the meeting from the Carbonizing Committee, the Gas-Heating Research Committee, and the Refractory Materials Committee. The first-named Committee were (there is every, and continued, evidence) brought into being before they could serve any very useful end. The position of carbonization questions causes the Committee to be practically impotent for the time; but it is hoped that eventually their appointment will be fully justified. The dissolution of the Gas-Heating Research Committee is mentioned; but a third and final report from them will form part of the technical proceedings at Glasgow. The most useful and practical results have followed the appointment of the Refractory Materials Committee; and the meeting will have from them the second section of the standard specification relating to the manufacture and testing of ordinary fire-bricks, blocks, tiles, &c. Mr. Harold Hartley, M.Sc., the Research Fellow, has, Professor Bone reports, been busy with investigations into the factors operative in surface combustion, at temperatures below the ignition point of the gases examined—principally carbon monoxide and hydrogen—but the time is not ripe for furnishing any final conclusions. There is a long report, penned by Mr. J. W. Helps, as representing the Institution, on the work of the International Committee on Screw Threads. But there again, it will be remarked, various points still hang in the balance.

The Institution are also interesting themselves in the Road Congress to be held in London in 1913; and it is as well, in view of the place that tar and pitch are taking among materials for constructing and maintaining roadways. The report likewise indicates the preliminary work that has been done, in association with the Institution of Electrical Engineers and the Illuminating Engineering Society, in the matter of the preparation of a specification for street lighting. The specification, when finally issued, will at all events stand with an imprimatur upon it that will be a strong recommendation to adoption. But until the outcome, as a whole, is actually seen, judgment upon it must be reserved. Meanwhile, however, it is observed that the foot-candle value of the illumination received, and not the

candle power of the source of the light, is to be the recommended superior factor in the basis of contract. It would be distinctly interesting to have more information as to the differences of opinion that occurred regarding the relative advantages of tests respectively made on the horizontal plane and at right angles to the light rays. The Institution representatives strongly advocated the latter method; but they were in a minority. However, it will be better to discuss the terms of the specification when other matters have been settled, and its full conditions are available.

It is gratifying to find that the Council of the Institution have taken up the matter of the publication of the names of the successful candidates in the City and Guilds of London Institute examinations in Gas Engineering and Gas Supply, and with good result. The refusal last year, on the part of the City and Guilds of London Institute, to (as theretofore) supply to the Press a complete list of names, it will be remembered, necessitated the compilation of a list in a circuitous manner that was open to the unintentional commission of very grave error. That was unsatisfactory. The Council of the Institution, however, have prevailed upon the Executive Committee to consent to communicate future results of the examinations to the Institution as soon as possible after they are ascertained. That, so far as it goes, is satisfactory, if it ensures prompt publication. But we entirely fail to see why the list of successful candidates should proceed *viâ* the Institution to the sources of publication, when the old course was the more direct. This we may store away for a time among the other inexplicable things that have crossed our journalistic path.

Coal Liming Redivivus.

MANY of our older readers must have been somewhat startled to see the title to an article in last week's "JOURNAL" "Coal "Liming Revived," and more especially to find that one of the revivalists was no less a gas-manufacturing expert than Mr. R. O. Paterson, of Cheltenham, acting with Mr. Lionel E. Twycross, as a collaborator in the design of a patented apparatus for properly regulating the distribution of powdered lime among the coal, and for causing the lime to adhere in an effective manner to the coal by a process of steaming. The proposal will cause those who recollect the sharp controversy—at times of a somewhat caustic nature—that took place in our columns over the Cooper coal-liming process, between the years 1883 and 1887, to become reminiscent. They will remember the strenuous advocacy of Messrs. Cooper, Wanklyn, and Spice; they will remember, too, the sporadic experiments that took place in various gas-works in the country; and they will remember, also, how, after the great storm, sustained for some time by the keenest of the gas controversialists of the day, there came the calm, and the coal-liming process gradually sank into a state of oblivion. Those who have a personal recollection of the great controversy will also recall to mind that Mr. R. O. Paterson, in his Presidential Address at the Sheffield meeting of The Gas Institute, in 1883, disclosed the fact that he had been engaged in experimentally testing the claims that were then put forward for liming coal, with the result that, though he did not condemn the process, he was not sufficiently satisfied that there was in it enough to justify adoption until a very careful investigation had been made. The process then failed (though it had its good points), on the balance of advantages and disadvantages, technically and commercially. It has now been resuscitated under somewhat different conditions.

Cooper was by no means the first to suggest, or to put to trial, the liming of coal before carbonization; but he claimed to be the first to practically apply the system, and to unearth various benefits. He made some extremely broad claims; and Mr. R. P. Spice, the Engineer, and Mr. Wanklyn, the Chemist, gave him dogmatic support. The pages of polemical effort of the day on the subject form too extensive a chapter in the history of the technic of the industry to even cursorily run over now. But with the present revival, some words that were uttered on the subject at the North of England Association meeting, by Mr. Henry Woodall, in 1883, return, and have as much pertinence to-day as they had nearly thirty years ago. "I can quite conceive," said Mr. Woodall, "that an invention which failed years ago might "be a good thing to-day, because of the altered values of "the material extracted from the coal." He little thought that close upon three decades later those words spoken, possibly without a thought of the future, could be made use of again, and have the same freshness and applicability as—perhaps more so than—they had then. If, however, practical experience caused the much-lauded process to be abandoned in the eighties, there are three questions that will arise to-day. The first is, What has induced Mr. Paterson (with Mr. Twycross) to take up the process again? In what respect does the process as now put forward differ from that proposed by Cooper? What is the amount of encouragement that leads Mr. Paterson to speak hopefully, though (old and experienced gas maker that he is) with caution, as to the prospects?

The major part of the article published last week was a reproduction of the patent specification of Messrs. Paterson and Twycross—not claiming anything for the liming of coal *per se*, but solely for the manner of distributing and mixing the lime among the coal, and causing it to uniformly coat the coal by steaming. In a small addendum to the main part of the description of the process, there is the confession that at Cheltenham, after lime purification was surrendered in 1907, there was acute trouble with sulphur compounds in the gas. There is the cause for an experimental reversion to the use of lime in a form other than the charging of purifiers with it, with all the nuisance and disturbance of peace of mind that are inseparable from purification in this particular fashion. There was no intention to return to this form of securing greater freedom from the vexatious excess of grains of sulphur compounds, if a simpler efficacious plan could be devised. This being so, have Mr. Paterson and Mr. Twycross hit upon a plan of applying the lime that escapes the rocks on which the Cooper process was wrecked in the 'Eighties? We cannot say; but it is very probable. If it should be so definitely, it will only prove the narrowness of the division that sometimes separates success from non-success. It was a rough and primitive sort of system that was adopted by Cooper. There was very little regularity in the matter of proportioning the lime used to the character of coal in the work that was done years ago; there was no thorough mixing; and the application was, to say the least, of a crude order. The lime was slacked with its own weight of water, and simply thrown over the coal that was awaiting use before the retort-bench. All this is, as already explained, altered by Mr. Paterson and Mr. Twycross. The quantity used of powdered lime is regulated, properly mixed, and it is caused to cohere to the coal by steaming. Is this the secret of the success reported? Several times in the controversy of years ago, the crude style of application was severely handled; but the question of the cost of introducing refinement was ever set against the argument.

Now as to the encouragement that the experimenters at Cheltenham have received. There is no question that the primary object of the liming there—that of reducing the sulphur compounds—has been realized. Writes Mr. Paterson: "We are able now to keep down to an almost uniform "daily figure of 20 grains per 100 cubic feet of gas—using "less than 2 per cent. of lime, calculated from the weight of "coal used." This is good and satisfactory. But are there any countervailing disadvantages? Not one is mentioned. On the contrary, "there are collateral advantages arising from "the liming process—such as the greater yield of gas and "ammonia per ton of coal carbonized, freedom from stopped "ascension-pipes, and less deposit of carbon in the retorts, "all of which in reality render the process a profitable "operation, in addition to getting rid of a large proportion of "the sulphur. No lime is visible in the coke." We shall await with curious interest the expansion of information regarding these several collateral advantages, in view of certain of the experiences of the 'Eighties. In respect of those experiences, there is at once from Cheltenham confirmation and contraction. The sulphur contents of the gas then, as now, were reduced; and it was at the time claimed that lime purifiers could be dispensed with, and that the oxide purifiers would run for longer periods. It had been generally known prior to Cooper's prominent appearance upon the stage of gas affairs that lime had the effect of appreciably increasing the yield of ammonia per ton of coal carbonized. The experiments of the day at Tunbridge Wells and elsewhere proved it; and Cheltenham again confirms it. Freedom from stopped ascension-pipes was put forward as a merit of the system; and the same to-day. We do not see that Mr. Paterson claims for the process (as was done in the eighties) any effect in augmenting the yield of gas per ton of coal; but to set against this he has less carbon deposit in the retorts. Mr. Paterson does not say anything about an increase in illuminating power; that, however, was among

the claims of nigh upon thirty years ago. Nor does he, as was done then, lay claim to an increase in the production of tar. The conditions of carbonization have since altered considerably.

This brings us to a point upon which there will be more curiosity than perhaps any other. It is as to the effect of the liming upon the coke. Mr. Paterson tells us that "no "lime is visible in the coke." That does not carry us very far in disposing of the extraordinary mass of evidence of the 'Eighties as to the malefic result of the process on this, the principal secondary, product. Mr. Paterson himself said in his Sheffield address, speaking of his laboratory investigation: "Not only was there no improvement in the coke; but "there was a distinct deterioration, and, for domestic fires, "it was rendered useless." There was almost unanimity among gas engineers when Cooper's process was under trial as to the mischievous effect of the liming on the coke—through, among other ways, the greater proportion of sulphur contained in the coke, and the bad effect the coke used as fuel in the settings had upon the furnace-bars. A flat contradiction was given to all such assertions by Messrs. Cooper, Spice, and Wanklyn; but it could not shake the firm convictions and experiences of the practical experimentalists. Now we shall be interested in learning something more about the effect (if any) on the coke. Speaking generally, too, there is the question of cost, as between this system of applying the lime and using lime in purifiers. But, in this regard, the bare cost of application cannot stand alone; relative advantages and disadvantages have also to be brought into the reckoning.

There stands the matter. Have Mr. Paterson and Mr. Twycross solved, through simple means, the riddle that was left unsolved more than a quarter of a century ago? The system was then found wanting. Is it so no longer? Cheltenham must give the answer.

Population and Gas Business.

THE President of the Local Government Board (the Right Hon. John Burns) has given to the country the provisional figures relating to the recent census of England and Wales; and, as it may be taken that they are approximately correct, those who look upon the growth of population as a growth of opportunity for business will regard the figures presented with much gratification. They show that the population of England and Wales has increased during the past decade, by 3,547,426, to 36,075,269—the increase being equivalent to 10·91 per cent.

The increase is spread fairly through the country. London is greater than ever, though the central part is being left more and more to business, and forsaken for residential purposes. This only means that the outer ring is reaping the advantage of the migration, and particularly so those boroughs and districts just beyond the borders of London. Besides their own internal growth, there has been a large overflowing of the workers of the Metropolis into those towns and districts; and this partly accounts for the notable percentage increases in gas consumption that have been witnessed of late years in these extra-metropolitan areas. The census returns, as well as comparative tramway statistics, confirm what has been generally known. Improved means of locomotion, pressure of business requirements for more space in Central London, the demand for more modern habitations, and the human fancy for spending further away from the scene of daily toil the hours of leisure and rest, are jointly responsible for this. In the Administrative County of London in the last ten years, the population has decreased by 13,306; but taking Greater London there is an increase of 671,561. The increase, however, seems to have been confined to few parts. There has only been an increase in nine of the boroughs of London—Wandsworth and Lewisham taking the lead; and in the remainder there has been a decrease, yet, as the figures indicate, not by any startling numbers. The statistics, however, show good cause for the Gaslight and Coke Company betimes following the residential movement by annexing some of the territory lying beyond its former borders. Of the cities and boroughs of England and Wales, only four show a decrease in population; and among the remainder there are some remarkable increases. There appears to be a distinct migration, too, from the agricultural districts to the industrial centres. But the position of things is summed up in 10·91 per cent. increase in population in the decade.

This must all be good for the gas business among other trading in commodities that are now looked upon as of the necessaries and conveniences of life. It is interesting to see how the gas industry of England and Wales (excluding Scotland and Ireland to conform with the census returns) has progressed in the private business in its staple commodity between the present census and the previous one. Unfortunately, the aggregate data for last year are not yet available; so that nine years must be taken as giving a fair representation of the course of expansion, remembering that the results would be better still if the increase of last year could be included. The figures are taken from the Board of Trade returns; and therefore embrace all the statutory concerns in England and Wales. Combining the consumption returns for gas companies for the year 1901 and those for local authorities for the year ending March, 1902, it is seen that the sales of gas (omitting public lighting) amounted to 121,290,610,601 cubic feet; while in the year 1909 for companies and 1909-10 for local authorities, the sales reached 151,461,161,887 cubic feet—being an increase of 30,170,551,286 cubic feet, or 24·87 per cent. In the same period, the number of gas consumers has increased from 3,332,330 to 5,352,743; being an increase of 2,020,413, or 60·63 per cent. These percentage increases stand exceedingly well in relation to the percentage increase—10·91—in the population of England and Wales. They also show that the ratio of consumption to consumers has considerably altered—this being due to the gas-economizing incandescent burners, and to the great influx of prepayment consumers. But the average consumption per consumer has not decreased through this in the proportion that might have been anticipated, seeing how low in some districts runs the average consumption of gas of the slot meter consumers. In 1901-2, the average sale of gas per consumer was 36,398 cubic feet; while in 1909-10 it was 28,296 cubic feet—being a decline of 8102 cubic feet. That the average was as high a year ago as 28,296 cubic feet is a testimony to the effect that the use of gas for purposes other than lighting has had upon consumption. The final figures in this comparison that are of equal interest are these: In 1901, the gas industry in England and Wales had 1 private consumer to every 9·76 of the population; in 1909 (using the census figures just published) 1 consumer to every 6·74 of the population. This last figure would no doubt be further reduced if we had at hand the total number of private consumers connected up at the present time to the gas-mains of England and Wales.

Meeting of the French Gas Association.

THE members of the Société Technique du Gaz en France held their Thirty-Eighth Annual Congress last week at Marseilles, under the presidency of M. Henri Marquisan, who is a Director of the Gas and Electricity Company serving the great seaport near the mouth of the Rhône. The members, who mustered about two hundred and fifty, received a cordial welcome from the Company, by whom they were entertained at a banquet, as well as from the Municipality, as evidenced by the presence at the social functions of the Deputy-Mayor, as representative of the Mayor. The meeting was held a month earlier than usual, possibly out of consideration for the personal comfort of those attending it; for the temperature in a Mediterranean town towards the end of June would be scarcely bearable by people accustomed to higher latitudes. From our own point of view as journalists, the change is convenient; for, under the old arrangement, the meetings of the English, French, and German Associations followed each other so closely that the result was a veritable *embarras de richesses* in the shape of technical matter to be dealt with. Now we shall be able to make a better distribution of it. As will be seen from the short review of the proceedings which appears elsewhere, the members were confronted with a list of about thirty papers. This seems a formidable number compared with the eight or nine which our Institution invite the members to discuss; but many of them are short. We give to-day translations of some of the more important of the papers; and the rest will be noticed in subsequent issues. Those of our readers who have watched the proceedings of the Society will remember that of late years there has been a departure from the old ways, first by the introduction of specified subjects for discussion, and more recently by the constitution of Committees to deal with questions relating to the manufacture and distribution of gas, supply technical information, and conduct analyses

of coal—all very much on the lines of our own Institution Research Committees. These and other matters were referred to by the President in his Inaugural Address, an abstract of which, by his courtesy, we are able to give. It bears evidence of the recognition by the Society of the appropriateness of the adage "*Tempori parendum*"—they must move with the times. In addition to disposing of the long bill of technical fare, the members visited the gas-works and the transformer station; and after three days of hard work they no doubt enjoyed the excursion to Huyères, which brought to a close an interesting and instructive meeting.

Advertising Gas at the Coronation Exhibition.

In last week's issue was an indication as to the character of the display that is being made by the Gas Companies' Joint Exhibit Committee at the Coronation Exhibition at Shepherd's Bush. The exhibit was practically completed at the end of last week; and an inspection was made by the Committee on Thursday afternoon. The display will be found (as last year) in the Decorative Arts Building (No. 14); and all who pay it a visit will agree that the Committee have made an even more attractive demonstration than last year, and have given to it a good advertising value. To carry out this work, the Committee acknowledge the fair response they have had to their appeal for financial assistance. But they are cramped in the matter of funds for prosecuting the work that the display naturally involves, and the extended work that the exhibit gives them the opportunity for engaging in if the requisite funds were available. "More money," it was incidentally remarked the other day by one who has been actively engaged in connection with the organizing of the exhibit, "would enable us to make it a thorough success." It would be a pity for operations to be limited for the sake of the amount of money necessary to give the Committee greater latitude. Let us put the question direct: "Will your undertaking subscribe towards the essential additional money?" If so, the Hon. Secretary and Treasurer is Mr. F. W. Goodenough; and cheques can be addressed to him at the offices of the Gaslight and Coke Company, Horseferry Road, London, S.W. Visitors to the stand will find it again under the superintendence of Mr. Edward Pilbrow, who, in addition to his experience as an official in Mr. Goodenough's department (sales of gas) of the Gaslight and Coke Company, has become an expert in gas exhibitions.

Consumers and Ratepayers in Birmingham.

There was quite an interesting discussion in the Birmingham City Council last week, when the report and accounts were submitted of the working of the gas undertaking during the past financial year. The net balance available to go in aid of the improvement rate is the very large one of £75,000, which is £3000 more than a year ago, and, in fact, the largest contribution that has been made to the improvement rate of the city. In addition to this, the Committee recommended a re-arrangement of the scale of charges for gas, which offered substantial concessions to the different classes of consumers—the rate for very large quantities being brought down to 1s. 3d., which, subject to 5 per cent. discount for prompt payment, is equal to a net charge of 1s. 2¼d. per 1000 cubic feet. Thus the consumers (as well as the ratepayers) may fairly claim to have benefited considerably by the good management and consequent prosperity of the department—but not sufficiently to satisfy Mr. Arter, who is of opinion that both the price of gas and the amount that is handed over in aid of the rates should be smaller. He had strong arguments to adduce in support of his case—indeed, this was evidently recognized by Alderman Sir Hallewell Rogers, who admitted that the principle was one which the Council would have to consider sooner or later. He, however, urged a view of the matter which is also entitled to consideration—namely, that it was a question which had better be left to the enlarged Council. The Bill sanctioning the amalgamation of the city with various outside bodies having now been passed, there are, of course, other people besides the members of the existing Council who may claim to have a say on subjects which concern the general body of ratepayers, present and future.

The Question of Profits.

With Mr. Arter's main arguments it is not necessary to deal. They are familiar to "JOURNAL" readers—but none the worse for that—through reiteration in connection with different undertakings. As time goes on, the hardships which may be brought about by the transfer annually of huge sums in aid of the rates—for instance, making those who use gas bear a portion of the fair burden of those who do not—are becoming more and more widely recognized. Briefly, what Mr. Arter contended for was that the price of gas should be reduced forthwith to such a rate that, after paying the working expenses (including upkeep and repairs), the following items should be provided for: Sinking fund and interest; abandoned plant, buildings, mains, &c., but not excessively or arbitrarily charged; and a contribution of £50,000 to the rates, to include the contributions allocated to public lighting. Many persons will think that, if the suggestion of the sum in relief of the rates errs at all, it is on the side of generosity. Anyway, the principle of Mr. Arter's case does not appear to have been appreciably weakened by the reply of Sir Hallewell Rogers—that it was possible that during the period of a coal strike the profits might be wiped out entirely, and that, in accordance with the Consolidation Act, the whole of the surplus profit, after making provision for the actual maintenance of the undertaking, had to be transferred to the improvement rate.

Recognition of Officials Working Abroad.

We must say, though it is not a point of great magnitude, that we sympathize entirely with a suggestion made, and the reasons advanced in support, by Mr. Robert Dempster towards the end of the proceedings at the meeting of the Monte Video Gas Company last Thursday. He has noticed, and we have likewise, that several gas companies carrying on operations abroad, but financed by British capital, do not print, in conjunction with the names of the Board of Directors, on the report and accounts, the names of the responsible officials who look after the interests of the concerns at the seat of manufacturing and business activity. The reason why this should be the custom is not at all clear, except in the case of companies who have several stations—such as certain of the Continental companies—and the printing of the list of whose officials would make rather a formidable display. In cases, however, where the practice of our home gas companies can be followed, it would be politic, we think, to do it. It would not cost a company anything, and would in no wise trench upon the dignity of the Board. The shareholders ought to have kept before them, equally with the names of the Directors working in London, the name of the responsible man or men who have the trust reposed in him or them of the proprietors' interests at a distance separated from home by (in some cases) many thousands of miles. In the case of the Monte Video Company, there is, we believe, both a Gas Manager and a Dockyard Manager. Men in such positions in the gas industry must, as a rule, like to be identified by name with the results achieved in the manufacturing and the trading; and the recognition and the compliment cost nothing, though we are sure that it would be highly appreciated by those who labour far from home. Their work is of a much more difficult order than that of gas engineers and managers here. Therefore, not to recognize them, and pay them the little compliment now suggested, is, Mr. Dempster thinks, an injustice. There is another point—that personal identity with an enterprise must act as a stimulant to energy. Not that we suggest that additional stimulus is required at Monte Video.

Municipal Gas-Works Results.

It is a gratification to be able to place on record a further batch of results of the past financial year's working of gas undertakings in the possession of local authorities, which are in every way as satisfactory as those already noticed. The surplus profit for the year at Coventry (including the balance brought forward) is £19,384, which is the highest recorded in the history of the undertaking. Of this sum, £4500 the Committee recommend shall be paid over to the general district fund in aid of the rates, and £14,000 be set aside to meet the estimated cost of purifying plant to be erected at the Foleshill works. The total revenue at Leeds was £383,062; and an expenditure of £271,319 leaves a gross profit of £111,743, as against £98,321 for the previous year. After the necessary deductions, there is a surplus of £18,100 to be transferred to the city fund in aid of the rates, which is £12,000 more than a year ago. While the revenue from gas shows a falling off of about £5000, the returns from residuals are no less than £10,300 higher. A saving of nearly £3600 was also secured on the coal account. At Leigh (Lancs.) there is a net profit of

£2701, notwithstanding that the revenue has been diminished by reductions in the price of gas amounting to over £600. There was in increase of 3½ per cent. in the quantity of gas sold; and the make of coal gas was 11,164 cubic feet per ton carbonized. It will be noticed that, owing to the continual blocking of the purifiers, caused by the oxide caking hard on the wooden grids, it has been found necessary to reverse the inlet and outlet pipes, in order that the gas should enter at the top of the purifiers and go out at the bottom. Morecambe, whose excellent financial results were noticed last week, reports a make of gas per ton of coal of 11,923 cubic feet, or 705 cubic feet more than the year before. At Shipley, a loss in the six preceding years has now given place to a profit of £740. The quantity of gas sent out shows an increase of about 1¼ per cent. The sales of gas at Smethwick exhibit a remarkable recovery from the set-back experienced two years ago. Though the improvement is spread in varying degrees over all classes of consumers, the most noticeable feature is the revival in the demand for gas for power purposes. The net profit is £10,458, compared with £7403 for the previous year. After deducting the item for public lighting (£4465), contributed by the Gas Committee in aid of the district rate, there is a balance of £5992, which is transferred to the credit of the depreciation and extensions fund account.

Miners and their Leaders.

The men on strike in the Rhondda Valley have, by their latest move, it is pointed out, struck a severe blow at the principle of collective bargaining. On Saturday, a conference was held at Cardiff of delegates from all the Miners' Federation Lodges in South Wales to consider the provisional terms for the settlement of the Cambrian Combine Colliery dispute. These terms had been arranged by representatives of the coalowners and the Miners' Federation (as chronicled last week), and considered by the South Wales Coalowners' Association and the Executive Council of the South Wales Miners' Federation. The former ratified the terms; and the latter recommended the Cardiff conference to approve of them. Ever since the terms, agreed upon by the accredited representatives of both sides, became known among the miners, the local leaders of the Cambrian workmen have been exerting themselves in the direction of securing an adverse majority at the conference. With this knowledge, it was more a matter for disappointment than surprise to find, when the delegates assembled at Cardiff, that the terms were unanimously rejected, and the conference was adjourned to further consider the situation. One would imagine that now the strikers will be quietly left to remain on strike until even they are tired of it, or until they can no longer afford to remain idle.

Labour in Politics.

Trade unions have already found that the voluntary contribution of funds by their members for political purposes (the only legitimate course open to them for securing money for such objects in view of the Osborne judgment) is an ineffective mode of raising "the necessary." Therefore, we hardly think the Government proposals for giving trade unions the statutory right to engage in political work by representation or in other ways, payment for which is to be by money raised by voluntary contribution, will satisfy the Labour party leaders in the House of Commons, or those who control the destinies of the unions themselves. They have a Bill (which will now have to be dropped in view of the Government measure), by which it was sought to completely reverse the Osborne judgment, and to empower the unions to use their funds as they pleased for political purposes. This would mean that every member, whatever his political beliefs, would have to contribute, whether he liked it or not, to the support of a representative in Parliament and a policy directly opposed to his own political tenets. This would have been grossly unfair. The Bill of the Government proposes to give such men protection, by allowing them to continue their membership of a trade union, while allowing a majority of the members the right to determine whether or not the organization shall take part in political work as one of its objects, but the payments for which are only to be made out of a separate fund towards which no member who does not desire to do so need contribute, but he has to give notice of his unwillingness.

OBITUARY.

ALDERMAN JOSEPH BROWN, OF DEWSBURY.

Our readers will probably remember that Mr. James H. Brown, the Engineer and General Manager of the Nottingham Corporation Gas Undertaking, who is President of the Midland Association of Gas Managers, was unable to be present on the occasion of the meeting of the Association at Nottingham on the 18th inst., owing to the critical condition in which his father—Alderman Joseph Brown, of Dewsbury—was lying. We regret to record that the illness terminated fatally last Friday.

Deceased was a Norfolk man, and was intended for the teaching profession. On leaving Highbury College, he became a schoolmaster. But he devoted his leisure to the study of chemistry, and eventually entered on a business career; and in 1876 went to Dewsbury, where, in Savile Town, in close proximity to the gasworks of the Corporaton, he established a tar distillery. Not long afterwards, because of his attainments, he was elected a Fellow of the Chemical Society. Soon after he went to Dewsbury, he became a member of the Thornhill Local Board, was for seventeen years its Chairman, and had a seat on the Urban District Council till it was merged in the enlarged borough of Dewsbury. For twenty-three years he was Chairman of the Dewsbury Assessment Committee; and for a much longer period (from 1878) he was one of the Guardians—occupying the head position for a very long time. When the Poor Law Unions' Association of England and Wales was formed, he was elected a delegate, and up to his death was the Chairman. At the first election of councillors for the enlarged municipal borough, which took place on the 9th of March last year, Mr. Brown was elected to represent a Thornhill ward; and three weeks afterwards he was promoted to a seat on the aldermanic bench. He was a Borough Magistrate, a member of the executive of the Dewsbury and Heckmondwike Water Board, and a Vice-President of the District Infirmary.

During the past four or five years, Mr. Brown had not enjoyed robust health; and he was periodically confined to the house. His last illness attacked him about three weeks or a month since; and a fortnight ago it was arranged that he should be taken to the residence of his son-in-law, Mr. Harold France, at Dewsbury Moor. But the change was not beneficial; and he gradually lost strength. He was 69 years of age. He leaves a widow, six daughters, and one son (Mr. Brown, of Nottingham); the only other son having lost his life in a railway accident.

It was arranged that the funeral, fixed for yesterday at the Dewsbury Corporation Cemetery, should be of a semi-public character; the deceased being greatly respected.

Many of our readers will no doubt have seen in the daily papers an account of a fatal accident a few days ago to a Mr. B. G. Benson, at the Hendon Flying Ground. We regret to learn that the unfortunate young man was the son of Mr. Walter Benson, the Managing-Director of Messrs. D. Hulett and Co., Limited, of High Holborn.

A large number of our readers will, we are sure, learn with regret of the recent death of Mr. Henry Perry, of Pedmore Court, Stourbridge, the senior member of the firm of Messrs. Mobberley and Perry, Limited. The deceased gentleman, who was in his 76th year, had suffered from heart trouble, and had been staying at Weston-super-Mare for the benefit of his health. He returned home on the 16th inst., and, though he did not appear to be any worse, he was seized with serious illness not very long after his arrival, and expired rather suddenly about noon the following Thursday. Mr. Perry was not in early life connected with the business with which his name has for so long been associated; but about forty years ago he entered into partnership with the late Mr. John Mobberley, and founded the fire-brick manufacturing works which have become so well known in the Midlands. The funeral took place at Pedmore Church on Monday last week; and there were present the remaining Directors of the firm, the officials and staff from the various works and collieries, representatives from different societies, and some 500 of the employees. General regret was expressed at the removal of one who was so well known for his courtesy, geniality, and honourable dealing. Many tributes of regard and respect have been received by the firm from leading gas engineers throughout the country. Mr. Perry leaves a widow and two sons, Mr. G. H. Pearson Perry and Mr. J. Edgar Perry.

PERSONAL.

Mr. Chas. A. Pelley, Assistant to Mr. C. G. Dawson, the Engineer and Manager of the Paignton Gas Company, has been appointed Manager to the Brecon Gas Company.

In the last number of the "Journal" we expressed regret at having to record the sudden illness of Mr. Joseph Tysoe, the Engineer-in-Charge of the East Greenwich station of the South Metropolitan Gas Company, as the result of a shock following a collision with the motor-car, which he was at the time driving. We are pleased to learn that the favourable progress towards recovery announced last week has been maintained; and Mr. Tysoe is now able to leave his room.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 626.)

THERE was not the slightest improvement last week in the general state of things on the Stock Exchange, but rather the reverse. Experienced observers say it ought not to be so, and they cannot understand it. There is no ostensible cause sufficient to account for it, although there may have been some amount of over-speculation for the rise which has had a strong reaction. Anyhow, business last week was quiet and dull and depressed, with hardly a bright ray anywhere. The opening day was inactive, and movements were irregular. The gilt-edged class were about the strongest market, although money stiffened, and Consols rose ¼. Railways were weaker on the whole; but Americans were fair. Tuesday's business was of very small magnitude; and the tone was quite dull and languid. Consols rather gave way, Railway prices were lower all along the line, and Americans were mostly down. On Wednesday, things were just as bad. Consols were weaker, Railways receded before pressure to sell, and the other chief markets were heavy. Thursday was dull too, but not quite so bad as the day before. Government issues were weak; but Consols almost recovered before the close. In Rails, one or two lines were a little firmer. But Americans continued to fall. Markets went heavily on Friday. Weakness persisted in Government issues, and Rails were again freely sold. Saturday was less depressed, though far from strong. Consols closed firmer, after touching 80 1/16; the total loss on the week being only ⅛. In the Money Market, there was a good demand; but there was an abundant supply before the close. Business in the Gas Market was a good average. The tone remained practically unchanged, though one or two issues were fractionally easier; and, *per contra*, several advanced. In Gaslight and Coke, the ordinary was fairly active, and prices ranged from 105¼ to 106¼; the quotation being lowered ¼. In the secured issues, the maximum realized from 86¼ to 87, the preference from 103 to 104, and the debenture from 80 to 81½. South Metropolitan was very quiet and unchanged at 119½ to 120. The debenture fetched 80⅜. In Commercials, the 4 per cent. was done at from 114½ to 115½—a rise of ¼. Among the Suburban and Provincial group, Bournemouth "B" was active at 16⅛ and 16⅜, South Suburban realized 119¼, and (on the local Exchange) Sheffield "C" 235¼. At the Mart on Tuesday, Messrs. Richards sold £13,000 Wandsworth and Putney "C" stock in thirteen minutes. In the Continental companies, Imperial marked from 186 to 187, Union 95, and European from 19 to 19½. Among the undertakings of the remoter world, Bombay changed hands at 6⅝, Buenos Ayres debenture at 97½ (a rise of 1), Hongkong at 17½ and 17 5/16, Melbourne 4½ per cent. at 100½, Oriental at 138 (a rise of 1), Primitiva at from 7¾ to 8 (a fall of ⅛), ditto preference at from 5⅜ to 5½, ditto debenture at 99 (a rise of 1), and San Paulo at 17⅞, with a subsequent rise of 2.

ELECTRICITY SUPPLY MEMORANDA.

The "Safety" of Electricity Installations Imperilled—Woking Failures—Gas-Engine Use—Miracles at Hastings—The Ratepayers' Burdens—Differential Prices for Public Lighting—Some Pertinent Questions.

RESPECT for our electrical contemporaries rises and falls in barometrical fashion. At the moment, we entertain a great amount of respect for the opinions of the "Electrical Review" on the subject of the new rules of the Institution of Electrical Engineers (to which reference was made last week), and at the same time forgive it any little electrical commonplaces that may have been printed in its columns on the subject of gas-stoves. Touching the former question, the "Review" regards very seriously any recession from the "high standard" set by the Institution's previous rules for the purpose of securing safety. From what we read, it may be inferred that, if the revised edition of the Institution rules is accepted and followed too closely, there is likely to be in the future an increase in the number of fires of electrical origin. If this is not so, then we cannot divine the reason for protesting against relaxation. A writer in our contemporary—Mr. Donald Smeaton Munro—in expressing regret that the standard British rules should lead to decrease in stringency when the inclination of the rules in other countries is in the general direction of a higher standard of work, does not hesitate to face the truth. "The increase in electrical fires and accidents," he says, "within the last few years does not seem to indicate that we are at a stage to cut down the margins of safety." That is brave of Mr. Donald Smeaton Munro; and we give him full and overflowing credit for having the courage of his convictions. There is something more direct about it than there is in the editorial remark of our esteemed contemporary: "The fact that no accidents, either from shock or fire, have been recorded in connection with installations carried out in accordance with the old rules is scarcely a sufficient reason for relaxing the stringency of the rules—indeed, it might be used as an argument for maintaining the old standard." If the point made in the first two dozen or so words in this quotation is true, then, forsooth, the old Institution rules cannot have been very generally observed in making installations.

The keynote of the editorial in the "Review" and of the article by Mr. Munro is the maintenance of safety by a high standard of work. Reminder is given in the former that the Phœnix Fire Office has not adopted the Institution rules, and that its rules in many points are more stringent than those of the Institution. And Mr. Munro says a perusal of the new Institution rules greatly increases one's respect for the old Phœnix rules. The "Review" gives, as an instance of the differences, its impression that such methods of wiring as the Stannos do not find much favour in the eyes of the Phœnix experts, although they appear to be recognized in the new Institution rules. Then follows a question in the reply to which we, like our contemporary, would be interested. It is this: What attitude would be taken by the Phœnix Fire Office in the event of a consumer whose installation had been wired in accordance with the Institution rules, desiring to insure with that Office? There are numerous points to which exception is taken in the new rules by the critics. Among them disapproval is expressed with the considerable increase in the current carrying capacity of conductors, and the permissible overload in these conductors due to the rating of fuses. There is a point to which Mr. Munro calls attention in which we are directly concerned. One of the rules provides that metal conduits must have no contact with gas-pipes. The critic very properly suggests that this should be extended to all other pipes, bell wires, and structural iron work. For these make contact elsewhere with gas-pipes. Even where there is no gas in a building, much damage has been caused by current escaping from live conduit and melting water-pipes before a fuse finally disconnected the faulty circuits. Further, the provisions do not appear to be exacting enough with regard to earthing. Connections with structural iron work, hot water, high-pressure water and steam-pipes, gutters and drains, should be definitely discouraged. There is no doubt about it that it is considered by these electrical annotators on the new rules that the *soi-disant* "safety" in the use of electricity is seriously assailed by the relaxations.

It seems that the electricity consumers at Woking are having heart-breaking experiences of failures of the electricity supply. It is an instance where little is heard of the repeated collapses and annoyance that consumers are put to; and, as one travels up and down the country, one hears of many other cases that do not get into the papers. But at Woking, the consumers appear to have had a bad experience. Last week we were told that there was an extinction of lights one evening a few days previously at 9.30; and it was not until some time the following evening that the relief came to at any rate the particular part of the district in which our informant resides. We cannot vouch for the accuracy as to the cause of the collapses. But he is very emphatic in his opinion that the cause of this particular failure was the absolutely rotten condition of the cables. At any rate, a new main has been laid in part replacement of the existing main along which the failure occurred; but he gives credit to the information he has received that a good portion of the cable is still rotten. This being the part in which this householder is personally interested, he is at the present time on the thorns of uncertainty as to experiencing another failure of the supply. That is a most uncomfortable position; and, as it is a case in which we can afford to be generous, we wish him a speedy and happy issue from his present affliction. The Company charge the high price of 6½d. per unit, with a discount of ½d. per unit if the amount of the account be paid within fourteen days. At such a price, householders are surely entitled to a proper supply of energy. But there is this to be said that, even in the best conditioned of electrical systems, the current sometimes fails, and causes consternation and inconvenience. It is, however, bad when these happenings are so frequent that those who have extended their patronage to electricity should live in perpetual suspense as to what a day may bring forth in the matter of inconstancy.

Some time since, the "Electrical Times" published a photograph of a "broken-down gas-engine which had been replaced by an electric motor in twenty-four hours." It has lately published another one—in this instance the engine was used to drive the packing-case machinery at a factory in Bradford; and again an electric motor came to the rescue. The Electrical Engineer of Bradford (Mr. T. Roles) is apparently the enthusiast who sent the photograph, and who wanted the electrical world to know of his remarkable feat in installing an electric motor in a few hours. We have never yet known our contemporary to publish the language employed by users of electric motors when there is a failure of electrical energy—and there are repeated failures in some districts—nor have we ever known it reproduce the photograph of an electric motor placed *hors de combat* through some organic disturbance. There are such things. The Chief Engineer of the British Engine, Boiler, and Electrical Insurance Company, in his last report, it may be remembered, said the ratio of breakdowns of insured motors during the year was 1 in 8·2 on continuous current and 1 in 9·5 on alternating current. But the "Electrical Times" is really not so bad as its publication of these photographs would lead some people to suppose. It is not inflexibly inimical to the gas-engine. Its most natural place, it says, is at the end of a dynamo spindle. In another place in the same issue, there is the recognition that "within the last few years, the small gas and petrol electric set has been rising in favour" for generating electrical energy for country houses; "and that thousands of them are so working with but scanty attention is really a remarkable testimonial to their construction and design." Sometimes we think that the electrical people are better informed on some matters than their writings picture them to be. The writings occasionally reveal odd views. For example, while a gas-engine is said to be

practically no good for direct driving, it is not a bad sort of thing for operating a dynamo.

Miracles are happening in connection with the Corporation Electricity Department at Hastings, or it would seem to be so, judging from statements in the local "Observer." We feel that it would be interesting to have the opportunity of getting in the rear of the published accounts of the department just to try to penetrate, through the actual working records, to the explanation of certain phenomena. Before commenting upon the wonderful happenings, let it be pointed out that £1676 is the net loss of the department for the past year, notwithstanding that the accounts show an improvement in the gross profit of £1336, made up of an increase in income of only £770, and a reduction of expenditure of £566—the increase in income being, in the main, from the public lighting. We learn from the "Observer" that the cost of coal last year was £2923, as against £3240 the previous year, or £317 less. Seeing that it is also declared that the fuel comes out weight for weight the same as in the previous year, it is manifest that the cost of coal per ton was less. But though the weight of coal used was the same, the units generated amounted to 68,551 more. We do not remember having heard of any new and more efficient plant being installed at the Hastings generating station. However, there it is that the department, using the same weight of coal, generated 68,551 units more electricity, and used and sold 73,661 more units—that is to say, more than 5000 units of electricity were sold over and beyond the additional quantity generated. Everybody wants to slap Mr. R. F. Ferguson, the Electrical Engineer, on the back for this performance. Can it be that this quantity was saved in some way—on the works, or in the distribution—and so was brought into account in the sales? Or is the explanation that some of the units brought into account, and paid for last year, have got there owing to the dates at which the meter indices were taken. It is merely a suggestion, and not an averment. However, if the Editor of the "Observer" likes arithmetical exercises, perhaps he will take the average cost of fuel per unit generated, multiply it by the number of units used by the electric incandescent lamps, and ponder over the answer. His commonsense must tell him that additional units cannot be generated for nothing, nor can machinery be run without costs accruing other than for fuel.

It seems to be thought that the improvement in the financial results of the year are largely due to the sale, at the very peak of the load, of electricity for the new electric incandescent street lamps at 2d. per unit. If this be so, then it would be quite logical to submit that the department would do better still by taking on a number of private consumers at 2d. per unit, and increasing the consumption at this figure to the fullest possible extent. But with working expenses and capital or standing charges running him in to a total of 5·93d. per unit. on the average of the total electricity sold, while the average income is only 5·435d., or ½d. per unit all round short of what it should be to effect a balance, we do not think that even Mr. Ferguson would be prepared to be too closely questioned (excepting perhaps by certain of the town councillors, and by the writer of "Flotsam and Jetsam" in the "Observer") as to how far he would like to push the supply of electricity to private consumers during lighting hours at 2d. per unit. The fact that, though the accounts show an improvement of £1336 for the past year, the business still carries a loss of £1676, is sufficient proof of insufficient regard for commercial principles. And it is only right, out of consideration for the ratepayers, that the Electricity Department should point out the weak spots that produce this insufficiency of revenue, and take the proper steps to rectify the recurring draft upon the pockets of the ratepayers who are not electricity consumers to enable the undertaking to make both ends meet. If the electricity supply were in the hands of a private concern, the ratepayers would not have to suffer in this way. At the same time, it is of interest to examine into the sources of the improvement in the accounts last year, so far as they are presented by them, to attempt to ascertain whether the improvement is of a character upon which dependence can be placed in future.

We have seen that nearly £566 of the improvement is due to reduced expenditure; and it is observed that this is made up as follows: The generating costs were about £297 less, which is not quite so much as the reduction in the cost of coal. That is not a condition of things upon which reliance can be placed, in view of the fickle conditions in the coal fields and markets. Then distribution costs have been reduced by £132. This is an interesting item in view of the increased work that must be demanded in the distribution department. There was a reduction in management of £81, and in "special charges" of £227. There is not one of these items upon which reliance can be placed for any further descent. Under expenditure, too, £139 more has had to be spent on the public lamps, and £33 more on rents, rates, and taxes. The improvement in income is also interesting. Of the 73,661 extra units used and sold, a large part of 58,000 units went to the public lamps at 2d. per unit, although the total average cost, including capital charges, is 5·93d. per unit. It is a slow, wearisome, and round-about journey that the Electricity Department are making in the endeavour to avoid the indignity of compulsorily making the ratepayers pay heavily towards the provision of electricity for those who require it. The number of private consumers increased by only 86 during the year; but the revenue from private consumers is only £127 more. Looking at these two figures, the lucrative business is not on the upward move at a good pace, nor is consumption increasing at any considerable rate among existing consumers, notwithstanding the temptations the metallic filament lamp is said to offer for increasing application. Nor will there be any considerable movement in this direction while the price of current for private lighting purposes is at the present figure; and the Corporation are going just the right way to work, through the public lighting, to protract the time when private consumers can receive any concession. The average return per unit, it is seen, was 5·385d. last year, as compared with 5·55d. in the previous year. This is unsatisfactory in view of the fact that the undertaking is not self-supporting, and the lower average price has not in any way benefited the private lighting consumer.

Then the income from public arc lamps was £169 more, owing to an increase from 3d. to 4d. in the price charged per unit. For the arc lamps the ratepayers are paying £25 a year each. On the other hand the lamps converted from gas to electricity yielded £562 more, less £139 extra expenses. But to get this revenue, the ratepayers have paid for converting lamps to date £1100. In addition, they are now paying more per annum for the lamps converted than was previously paid; and they are paying 4d. per unit for the current supplied to the arc lamps, and only 2d. per unit for the current supplied to the electric incandescents. This is one of the phenomena attaching to the Hastings Electricity Department. Why should they pay 4d. per unit for the arc lamps when 2d. per unit is said to be sufficient for the electric incandescents; and why should the private consumers during the same hours of use pay so much more than the charges for street lighting? And, further, the ratepayers have to find nearly £1700 again this year to meet the deficit on the trading of the department—making the gross deficiency to date close upon £16,000! Before leaving these accounts, there is one question we want to ask Mr. Ferguson on the figures now presented. It is this, Is the department receiving 2d. per unit for the electricity used by the new electric incandescent lamps? If these lamps only yielded £562, less £139 extra expenses, and 58,000 units, or thereabouts, of electricity were consumed by them, less perhaps the consumption of a couple of new arc lamps, the receipts per unit fell very far short of the 2d. per unit. There is something here that requires explanation; and there is another little arithmetical exercise for the Editor of the "Observer." However, the undertaking is far from self-supporting yet; and we fail to see anything in the present accounts upon which reliance can be placed in forming estimates as to the future.

NOTES FROM WESTMINSTER.

In very brief notes the proceedings last week on Gas and Water Bills in the Committee rooms can be presented.

A Venial Irregularity. The Luton Gas Bill has been before the Unopposed Bills Committee; and by them no change of any importance was made in what the Company are asking for. It has been a well-managed Company; and it demonstrates for a place of the size of Luton the excellent effect to all concerned of a low capital account. A low capital account has been partly achieved by good management, and partly by the fact that the Directors have dipped well into revenue in order to save piling-up capital. We have a little sympathy with past consumers. But we hope there are many of them still having use, and considerable use, for gas for lighting, heating, cooking, and power, and so are now enjoying the fruits of the policy of the administration. No one who is a gas consumer can to-day complain, seeing that ordinary consumers are being supplied at 2s., power consumers at a lower price still, and slot consumers at but (we think the difference is 5d.) a few pence above the ordinary. If there is any justification for what is, strictly speaking, an irregularity, it is found in these prices; and no one raises any accusing finger against the Company for any breach of trust. The Corporation and the consumers all kept clear of Parliament, seeing no earthly reason why the Company should be pilloried for the benefits they have conferred on the town. Consequently, the Company are going to get their capital, stand-by clause, and practically all else that they requested; nothing but minor adjustments of clauses being required of them. They will have to extend their manufacturing and storage plant almost immediately, and probably, in a couple of years or so, a new site will have to be acquired. The prospects of the Company are good; and it seems unquestionable that the pardonable irregularity of the past is accountable for the strength of the concern in the present.

Bulk Purchase or Separate Supply. The scheme of the Cudworth District Council for cutting themselves adrift from any other gas suppliers (they have hitherto purchased in bulk from the Barnsley Gas Company), and putting up works of their own, is not to go unchallenged now that the Provisional Order under which the necessary powers are being sought is to come, in a Confirmation Bill, before a Select Committee of Parliament. The Hull and Barnsley Railway Company, although the promoters offered strong resistance, have secured from the Court of Referees *locus* against the Bill—the Company alleging that the powers sought are unnecessary, and that the Council are going the right way to work to throw an additional burden on the rates. We are not going to prejudge the case before hearing the evidence; but the Cudworth District Council will be, in gas supply, something of an anomaly if it succeeds in working cheaper than a Company of the size of Barnsley. In the pursuit of economy, the gas industry is going more and more for reasonable

centralization, and decentralization in gas supply is practically dead as a policy, except in the incipient stages of professional promoters' schemes. The Hull and Barnsley Railway Company appear to obtain their supply for local requirements from the Barnsley Gas Company and the Royston Company; and while opposing the project as large ratepayers, they desire to have their sources of present supply protected. The Railway Company obtained their *locus;* and so the prospect is that we shall hear more about the Cudworth scheme.

Margam's Ambition. There commenced an interesting discussion towards the end of last week before Mr. Mooney's Committee in the Commons as to whether the Margam District Council should be empowered to purchase the part of the gas undertaking of the Aberavon Corporation within their district. The same Committee have before them, in a Confirmation Bill, a Provisional Order promoted by the Aberavon Corporation for further powers in connection with their own undertaking, among them a request for further capital authorization. The price of gas in Margam has been 4s. 2d.; it is now 3s. 6d. Still Margam has an inclination for being self-contained, and to dispense with the services of Aberavon in the matter of the gas supply. There is a hint that this Bill of the Margam Council is nothing more than an adroit move on their part to place another obstacle in the way of amalgamation with Aberavon. About this we cannot say anything. Margam denies the allegation; and the Council submit that, so far as Aberavon is concerned, if the Margam portion of the undertaking is separated, and compensation is paid, there will be no need for the further borrowing powers that the Corporation are seeking. The Committee have decided to defer decision in the Margam case until they have heard that of Aberavon on their own Order. It ought to be very clearly proved by the Margam Council that, with a separate undertaking, they would do better for the gas service of the district than Aberavon. If they cannot do this, then their scheme should not receive the ratification of Parliament. It is not always the case that a small gas undertaking can be run so economically and supply gas so cheaply as a larger one.

Rival Water Schemes. All through last week's sittings, the Duke of Northumberland's Committee continued to listen to evidence in connection with the rival Rhymney and Merthyr water schemes—that of the proposed Rhymney Water Board occupying more than half of the week, and then the Merthyr Bill was taken in hand. Towards the middle of the week, when it was seen how opponent after opponent popped up against the Water Board scheme, and each had a new aspect of objection to present against the constitution of a new Board, the noble Lords began to get alarmed. When they rise this week, they want to have their freedom not only over the Whitsun Holidays, but until after the Coronation. They strongly appealed to learned Counsel to exercise some amount of consideration and abbreviation. The Rhymney Railway Company, the St. Mellon's Rural District Council, the Bedwellty District Council, the Rhymney Iron Company, the Barry District Council, and the New Tredegar Gas and Water Company were among those who appeared and told their Lordships that no good could come out of this Water Board scheme. It was alleged that the rates would be adversely influenced, that the scheme was bad from the financial point of view, that private interests would be unjustly affected—in short, their Lordships were beseeched to leave things as they are. There certainly seems to be no great local demand for the Board or their scheme; and most of the influential interests appear to be absolutely content. Mr. Balfour Browne, K.C., very neatly, in the name of the Merthyr Corporation, summed up the grounds of opposition to the Board's Bill when he said it was full of complexities, and depended upon speculation and uncertainty. He alleged, too, that the Board were proposing to steal half of Merthyr's watershed, would take away customers whom Merthyr had supplied for years, and would render part of their canalization useless without any proposal as to compensation. The Board, he pointed out, offered Merthyr 2 million gallons of substituted water; but for this Merthyr would have to pay. In fine, the Merthyr scheme, it was contended, is all that is good; the other is an absolutely unprecedented and unnecessary one. The evidence, on behalf of the Merthyr scheme, was to the effect that it would conduce to efficiency and economy. Sir Alexander Binnie considered the Rhymney Board's scheme was the most impertinent proposal he had ever heard of in his life. There were some large ratepayers, for whom the Hon. J. D. Fitzgerald, K.C., appeared, in opposition to the Merthyr scheme; their objection being mainly as to its costliness. The evidence was continued yesterday.

A NIGHT VIEW IN THE CRYSTAL PALACE GROUNDS.

The High-Pressure Gas-Lamps Lighting the Terraces of the Grounds at the Festival of Empire Exhibition.

THE first illustration of the lighting of the grounds by Keith high-pressure gas-lamps at the Festival of Empire Exhibition in the article in the "JOURNAL" for May 16 was condemned by all who had had an opportunity of making an inspection for themselves, as presenting an extraordinarily bad indication of the actual state of affairs; and the photographer himself—Mr. Campbell-Gray, of the Festival of Empire Exhibition—was altogether dissatisfied with the untruthful character of the picture. He has, therefore, taken a fresh photograph which better depicts the splendid uniformity of the lighting. But between the actual thing and reproduction in our pages, there are several stages, at each of which something is lost in effect.

Gas Exhibition at the Agricultural Hall.

We have received preliminary information as to a project for an "International Gas Exhibition" at the Royal Agricultural Hall, from Nov. 11 to Nov. 23. It is stated that it is intended the exhibition shall comprise every kind of apparatus for the production of town's gas for the purposes of public and private lighting, cooking, heating, and the generation of motive power. The scope of the exhibition, it will be seen, is a large one; and if it really comprised every kind of apparatus for the production of gas and its utilization, the Agricultural Hall would scarcely be of adequate capacity. The Business Director is Mr. Thomas Cordingley, 22, Glasshouse Street, Piccadilly. The chief consideration for an exhibition of the kind in November this year is that it would succeed the exhibition that the electrical industry is holding at Olympia. At the same time, so far as London is concerned, the gas industry is being represented this year by the gas lighting and gas-generated electricity for lighting and power at the Festival of Empire Exhibition at the Crystal Palace, and by the Gas Companies' Joint Exhibit at the Coronation Exhibition at Shepherd's Bush. But whether the Agricultural Hall project is to be a real success must depend upon the decision of the Society of British Gas Industries, the Council of which has already been approached in the matter.

International Photometrical Commission.—Several inquiries having been received in regard to the next meeting of the above-named Commission, a letter was addressed to M. Th. Vautier, of Lyons, on the subject. In response, he states that the meeting will be held in Zurich, probably in the last week in July; but the date has not yet been definitely fixed.

INSTITUTION OF GAS ENGINEERS.

Programme of the Annual Meeting.

The Programme of the Annual General Meeting of the Institution of Gas Engineers, which, as already announced, is to be held in Glasgow from the 13th to the 15th prox., under the presidency of Mr. Alexander Wilson, M.Inst.C.E., the Engineer and General Manager of the Gas Department of the Corporation, has been issued by the Secretary (Mr. Walter T. Dunn).

The meetings will be held in the Glasgow and West of Scotland Technical College; and the proceedings on the first day will be opened at 10 a.m. with a reception by the Lord Provost of Glasgow (the Hon A. M'Innes Shaw), the Convener of the Gas Committee (Bailie Paxton), and the members of that body. Then will follow the submission of the minutes of the last annual meeting for confirmation, the appointment of Scrutineers, and the presentation of the Council's report (given below), with the accounts, and also the medals awarded for papers read last year. The President will then deliver his Inaugural Address, and the reading and discussion of papers will be commenced. A list of them was given in the "JOURNAL" for the 16th inst. (p. 437); and, as then mentioned, reports will, in addition, be presented by the Carbonizing, Gas Heating, and Refractory Materials Research Committees. In the afternoon, the members will be entertained at luncheon by the Corporation; and in the evening they will be afforded an opportunity of hearing Dr. Bone, the Livesey Professor of Applied Chemistry in the University of Leeds, deal with the subject of "Surface Combustion."

On the second day, the first business will be the holding of the annual meeting of the donors and subscribers to the Benevolent Fund, at which the report of the Committee of Management for the year 1910-11 will be presented, together with the accounts for the year ended Dec. 31, 1910, two members of the Committee will be elected to succeed those retiring by rotation, and other business connected with the fund will be disposed of. At the close of the meeting, the ordinary business of the Institution will be resumed. In the afternoon, there will be a joint meeting of the Commercial Sections, to which all the members of the Institution are invited. In the evening, there will be a reception and dance in the Banqueting Hall of the City Chambers, on the invitation of the Lord Provost and the Convener and members of the Gas Committee of the Corporation.

On the morning of the third day, the remaining papers will be taken, and the usual routine business transacted. In the afternoon, on the invitation of the President and Mrs. Wilson, the members will visit the Scottish Exhibition of National Art and Industry; and afternoon tea will be served in the Red Lion Tea-Room in the Court of Music.

On Friday, the 16th, there will be an excursion by steamer on the Firth of Clyde.

Annual Report of the Council.

The Council present the following report on the position of the Institution, and the work carried on during the past year.

Membership.—Referring to the table below, it will be seen that the total number of names on the register at the close of the year 1910 was 843, as compared with 829, the corresponding number for the previous year—an increase of 14. The additions consisted of one honorary member, thirty-five members, sixteen associate members, and one student.

Class of Member.	At Dec. 31, 1909.	Elected and Transferred during 1910.	Deceased, Resigned, Transferred, &c., during 1910.	At Dec. 31, 1910.	Increase or Decrease.
Hon. members	23	1	2	22	−1
Members	691	43 (8 transf'rd)	28	706	15
Associate members	95	16	12	99	−4
Associates	2			2	
Students	18	1	5	14	4
Totals	829	61	47	843	14

The Council regret that the deaths of the following members have to be recorded:—

Honorary Member.

Charles Foucart . . . . . Paris

Members.

Alfred Colson . . . . . Leicester
Charles Elliott. . . . . Leyland
Thomas May . . . . . Ramsgate
G. E. Saville . . . . . Southport
George Boleyn Smedley . . . . . Swadlincote
James Stelfox . . . . . Belfast
S. J. Symonds. . . . . Farnham
George Careless Trewby . . . . . London
William Butler Whitaker . . . . . London

Associate Member.

Stanley Hutchinson . . . . . Barnsley

Livesey Memorial Fund.—Since the Council's last report was issued, the total amount received has increased to £10,973, as detailed below. Printing, postages, and incidental expenses amounted to £63, leaving £10,910, which has been handed over to the Leeds University as the net proceeds of the fund for the establishment of a Professorship of Coal Gas and Fuel Industries, as decided upon by the contributors.

Summary of Contributions.

No. of Subscribers.				
14	Institution, District Associations, and Junior District Associations	£342	1	6
229	Members of the Institution of Gas Engineers	947	11	7
161	Gas Companies	7,107	8	0
24	Gas Committees of Corporations	540	16	0
55	Members of Society of British Gas Industries	538	1	0
29	Other Manufacturers, Coal Owners, &c.	308	13	0
96	Other Subscribers	745	14	0
608		£10,530	5	1
	Interest on deposit account	98	11	2
	Interest on current account (by special arrangement with bank)	344	6	8
		£10,973	2	11

The following letter and copy of resolution have been received from the University of Leeds; and it only remains to add that on the recommendation of the Committee, Professor William Arthur Bone, D.Sc., Vict., Ph.D. Heidelberg, F.R.S., has been appointed to the Professorship.

THE UNIVERSITY, LEEDS,

July 18, 1910.

SIR,—We have the honour to forward you copy of the resolutions passed at a meeting of the Council of the University on June 15.

We also desire to convey to the donors of the Livesey Memorial Fund the grateful acknowledgments of the Council for the munificent gift which they have made to the University. The Council regard it as a signal honour that a professorship commemorating the life and work of Sir George Livesey should be associated with the University of Leeds. Their efforts for the provision of higher education in Applied Science will thereby be greatly strengthened and encouraged; and they earnestly hope that the work carried out by the department of the University to which the new professorship is assigned will amply justify the generosity and confidence of the founders.

We are, &c.,

DEVONSHIRE, *Chancellor.*
ARTHUR G. LUPTON, *Pro-Chancellor.*
NATHAN BODINGTON, *Vice-Chancellor.*

COPY OF RESOLUTIONS.

1.—The Council record their deep sense of the honour done to the University by the offer of a fund raised as a memorial to the late Sir George Livesey for the endowment of a Professorship of Applied Chemistry relating to Coal Gas and Fuel Industries. The Council gratefully accept the offer, and hereby establish a Livesey Professorship of Coal Gas and Fuel Industries, subject to the conditions prescribed in the deed of gift submitted on behalf of the donors of the Livesey Memorial Fund.

2.—It was decided that the following should constitute the Committee on the Livesey Professorship of Coal Gas and Fuel Industries.

The Pro-Chancellor, *ex officio* (A. G. Lupton, LL.D.).
The Vice-Chancellor, *ex officio* (Sir N. Bodington, Litt.D.).
J. W. Bray, Scalby.
Professor Smithells, F.R.S., Leeds.
Alderman C. F. Tetley, M.A., Chairman Leeds Gas Committee.
Dr. M. G. Christie, Crigglestone, Wakefield.
J. W. Cobb, Farnley Iron Company.
W. E. Garforth, Altofts, Normanton.
J. E. Stead, F.R.S., Middlesbrough.

Nominated by the Institution of Gas Engineers.

Edward Allen, M.Inst.C.E., Liverpool.
J. Ferguson Bell, M.Inst.C.E., Derby.
John Bond, Southport.
Charles Carpenter, M.Inst.C.E., South Metropolitan Gas Company.
James W. Helps, M.Inst.C.E., Croydon.
Charles Hunt, M.Inst.C.E.. London.
J. W. Morrison, M.Inst.C.E., Sheffield.
Alexander Wilson, M.Inst.C.E., Glasgow.
Charles Wood, F.C.S., Bradford.
Corbet Woodall, M.Inst.C.E., Gaslight and Coke Company.

Nominated by the Society of British Gas Industries.

Thomas S. Clapham, Keighley.
Dugald Clerk, F.R.S., Lincoln's Inn Fields, London.
F. J. West, Miles Platting, Manchester.
H. James Yates, F.C.S., Aston, Birmingham.

Annual General Meeting.—Under the presidency of Mr. James W. Helps, of Croydon, the annual general meeting of the Institution (the forty-seventh since its establishment in 1863, as the British Association of Gas Managers), was held at the Institution of Mechanical Engineers, by kind permission of the Council of that body, on Tuesday, Wednesday, and Thursday, June 14, 15, and 16. The following communications were considered:—

Report of the Carbonization Research Committee.
Report of the Gas-Heating Research Committee.
Report of the Refractory Materials Committee.
"Public lighting from a Municipal Point of View" by Mr. Jacques Abady, of London.
"Experiments in Carbonization on the Birmingham Coal-Test Plant," by Dr. William B. Davidson, of Birmingham.
"Gas Calorimetry in the United States," by Mr. J. B. Klumpp, of Philadelphia, U.S.A.

"The Latest Installation of De Brouwer Stoking Machinery and Coke-Handling Plant," by Mr. S. Y. Shoubridge, of Lower Sydenham.

"The Management of Small Gas Undertakings," by Mr. F. J. Ward, of Knowle.

The Council have awarded the three medals, which are offered annually in connection with the papers read, as follows; and they will be presented accordingly at the forthcoming meeting: The London Gold Medal, to Dr. William B. Davidson, for his treatise on "Experiments in Carbonization on the Birmingham Coal-Test Plant;" the Institution Silver Medal to Mr. Jacques Abady, for his paper on "Public Lighting from a Municipal Point of View;" and the Institution Bronze Medal to Mr. Sydney Y. Shoubridge, for his description of "The Latest Installation of De Brouwer Stoking Machinery and Coke-Handling Plant."

In consequence of the national mourning, the reception and dance, on the invitation of the President and Mrs. Helps, which had been arranged to take place on the evening of the first day of the meeting, was not held.

Friday morning was occupied by a visit of inspection to the works of the Croydon Gas Company, by the kind invitation of the Chairman and Directors, by whom the party were afterwards entertained at luncheon. In the afternoon, the Japan-British Exhibition was visited; the President and Mrs. Helps receiving the party at tea in the Garden Club.

Committee re Constitution.—Mr. Helps devoted a considerable part of his address as President to questions having reference to the constitution of the Institution, and to the desirability of revising it, with the object of making the Institution more representative of the gas industry. A resolution was passed "that the Council be requested to appoint a Committee to consider the suggestions contained in the address, and prepare a report for presentation to the members, dealing with the future work of the Institution in general."

The resolution has been given effect to by the appointment of a Committee, consisting of the Council, and Messrs. Thomas Berridge, C. E. Brackenbury, Charles Carpenter, John Carter, Francis T. Cotton, Thomas Goulden, Charles Hunt, H. E. Jones, John G. Newbigging, Robert O. Paterson, Fletcher Stevenson, Hanbury Thomas, and Charles Wood. The Committee have considered a memorandum on the subject kindly prepared by Mr. Helps, but find that it is not yet possible to present a report to the members, such as is indicated by the resolution. It has, however, been arranged that the subject shall receive the further consideration of the Committee.

Affiliation.—The District Associations affiliated with the Institution have been represented on the Council during the year 1910-1911 as follows:

Eastern Counties' Association. . .	Mr. John Young.
Irish Association	Mr. F. T. Eustace.
Manchester District Institution . .	Mr. W. Whatmough.
Midland Association	Mr. Vincent Hughes.
North British Association	Mr. Alex. Waddell.
North of England Association . .	Mr. T. H. Duxbury.
Southern District Association. . .	Mr. C. Stafford Ellery.
Wales and Monmouthshire District Institution	Mr. R. A. Browning.

Examinations in "Gas Engineering" and "Gas Supply."—Mr. Thomas Glover, Examiner in "Gas Engineering," reports that at the examination on April 29 last, 270 candidates presented themselves, 94 taking the Honours paper, and 176 the Ordinary, as compared with 304 last year (106 Honours, and 198 Ordinary). Mr. J. H. Brearley, the Examiner in "Gas Supply," reports that the number of candidates sitting in his division on May 6 was 428, consisting of 89 Honours and 339 Ordinary, as against 303 last year (89 Honours and 214 Ordinary). The increasing interest taken in this course by those engaged in the distributing branch is very gratifying.

The prize winners for 1910 in "Gas Engineering" were: Honours Grade—first, Mr. Ernest Myers, of Sheffield; Ordinary Grade—First, Mr. Roland A. Weston, of Norwich; second, Mr. John William Dixon, of Manchester; and third, Mr. Rudolph H. Duxbury, of Manchester. In "Gas Supply," the prize winners were: Honours Grade—Mr. Francis C. Briggs, of London; Ordinary Grade—First, Mr. Stanley B. Johnson, of Hull; second, Mr. Francis Joseph Kennedy, of Manchester; and third, Mr. Robert Robertson, of Bath.

In regard to the publication of the results of last year's examinations, the attention of the Council has been called to the decision of the authorities of the Department of Technology of the City and Guilds of London Institute not to supply pass-lists to the Press, as usual. Recognizing the great desirability of publishing the full list of names of successful candidates as soon after the examinations as possible, the Council have been in correspondence with Sir Philip Magnus, Superintendent of the Technological Examinations on the matter, with the result that the Executive Committee have consented that in future the results shall be communicated to the Institution as soon as possible after they are ascertained.

Visit of the German Association of Gas and Water Engineers.—The visit of the German Association of Gas and Water Engineers, which, on account of the national mourning, was postponed from the last week in May, took place from the 3rd to the 8th of October, 1910; seventy-eight of the Association's members being present.

With the ready co-operation of the boards and committees of the undertakings mentioned below, a very interesting and enjoyable programme was prepared. On the first day, the Beckton, Kensal Green, and Fulham works of the Gaslight and Coke Company were inspected; on the second, the East Greenwich works of the South Metropolitan Gas Company and the works of the Croydon Gas Company; the third day was left free; the fourth was spent in visiting the Granton works of the Edinburgh and Leith Gas Commissioners and the Forth Bridge; and on the fifth day the Tradeston and Provan works of the Glasgow Corporation Gas Department were inspected, and a visit was paid to the Smoke Abatement Exhibition.

During the week, the party were hospitably entertained by the Institution, and by the respective boards and committees of the undertakings visited. The Council in expressing their gratification that the programme was carried through successfully, desire to acknowledge the services rendered by the Reception Committee entrusted with the arrangements, particularly Mr. H. F. Andresen, Dr. Harold G. Colman, Mr. Arthur P. Hayman, Dr. R. Lessing, and Mr. F. D. Marshall.

The balance of the reception fund (£67 8s. 2d.) has, with the consent of the contributors, been transferred to the Institution's special purposes fund, for use in carrying out investigation and research work in the interests of the gas industry.

A letter (of which the following is a translation) by Herr Prenger, of Cologne, the President of the Association, was subsequently received by Mr. Alex. Wilson, the President of the Institution:—

"On our return home we fulfil a pleasure and duty to express to you and to the Institution of Gas Engineers our most sincere thanks for the hospitable welcome accorded to us, and we do this while we are still under the influence of all the pleasant impressions connected with our visit. When we went over, we were persuaded that we should find much that was interesting and worthy of imitation, and that we should receive a cordial welcome from our brethren in the gas-engineering line. Our expectation, however, was far surpassed. The recollection of the manifold kindnesses and of the hospitality we received will always awaken in the memory of the members of our Association the greatest joy and gratification.

"The President of the German Association of Gas and Water Engineers has indeed special cause to express the most sincere thanks to you and to all other English colleagues for the hearty welcome extended."

Belgian Gas Association.—In acceptance of an invitation from the Belgian Gas Association, the Council arranged for representatives of the Institution to attend the Association's meeting, which was held at Brussels during the exhibition there. A very interesting and enjoyable programme was provided, and the Institution's representatives were received with great cordiality.

Special Purposes Fund.

Carbonization.—The Carbonizing Committee—Messrs. Charles Carpenter (Chairman), Edward Allen, J. Ferguson Bell, A. E. Broadberry, T. H. Duxbury, Thomas Glover, W. R. Herring, Lawrence Hislop, William Langford, J. W. Morrison, and S. Y. Shoubridge (Hon. Secretary)—report that, in view of the trials which are being made in this country of the various systems of vertical retorts, and also of the fact that several papers describing the results of the experience obtained so far with them have been promised for the annual meeting by the engineers of the various works where these systems are in use, the Committee have deemed it advisable to defer their endeavours to arrange comparative tests until the initial difficulties insuperable from new installations have been overcome. They feel that the results of such an investigation would be very valuable, and hope they may have the opportunity of undertaking them.

The Committee have watched the progress which has been made in the development on the Continent of vertical retorts and carbonizing chambers, and have had the figures given in their last report relating to it brought up to date for communication to the members.

No invention in connection with carbonization of striking novelty has been made during the year. There has been considerable extension of the system of using heavier charges and longer periods of carbonization; but, on the other hand, some engineers who have tried this method of working have reverted to lighter and shorter charges.

It is probable that no particular design of plant or system of working will give the best results from all classes of coal; and that local conditions must govern the determination as to the best course to adopt in each instance.

Gas for Heating Purposes.—The third report of the Gas-Heating Research Committee appointed by the Institution in conjunction with the University of Leeds will be presented at the forthcoming meeting at Glasgow—prepared by Mr. E. W. Smith, the Chemist, under the direction of the Sub-Committee, consisting of Messrs. John Bond, J. H. Brearley, and Charles Wood, representing the Institution, and Professors Arthur Smithells, William A. Bone, and Julius B. Cohen, representing the University.

For reasons stated in the report, the members of the Committee decided that their re-appointment was not desirable. On their recommendation, the Committee has been accordingly dissolved. The Council have passed a resolution conveying the cordial thanks of the Institution to the Committee for the valuable work they have conducted, and their acknowledgments to Mr. Smith for the skilful and assiduous manner in which he has discharged his duties as Research Chemist.

Refractory Materials.—The Refractory Materials Committee—Messrs. James W. Helps (Chairman), Edward Allen, John Bond,

A. E. Broadberry, H. G. Colman, W. Doig Gibb, Thomas Glover, Thomas Goulden, D. H. Helps, W. R. Herring, Edward Jones, James Paterson, S. Y. Shoubridge, Alex. Wilson, H. W. Woodall, and F. J. Bywater (Hon. Secretary)—report that they have had in hand the preparation of the Standard Specification for Fire-Brick and Retort Material, which was foreshadowed in their last report, and issued the first section of the specification—viz., that relating to the manufacture and testing of retort material—in December last.

The specification was drawn up by a Joint Sub-Committee, consisting of representatives of the Refractory Materials Committee and of the Retort and Fire-Brick Section of the Society of British Gas Industries, and has been favourably received.

The second section of the standard specification—viz., that relating to the manufacture and testing of ordinary fire-bricks, blocks, tiles, &c.—is now being completed, for presentation at the forthcoming meeting of the Institution.

Gas Research Fellowship.—The following interim report upon the work of the Institution's Research Fellow during the past year has been received from Professor Bone:

The Research Fellow (Mr. Harold Hartley, M.Sc.) has continued his investigations upon the factors operative in surface combustion at temperatures below the ignition-points of the gases examined. He has principally confined his attention to the combustion of carbon monoxide and of hydrogen; and among other things he has investigated (1) the influence of water vapour upon the rate of combustion of carbon monoxide in contact with fire-clay and other surfaces; (2) the electrical condition of certain surfaces during the combustion of gases in contact with them; and (3) the effect of previous exposure to air and other gases upon the activity of various surfaces. The experimental results have explained many obscure points in connection with the phenomenon of surface combustion, and have also suggested new directions for further work. But at present it is not possible to give any final conclusions. In view of the present position of the investigation, I propose to recommend an extension of Mr. Hartley's tenure of the fellowship until March 31, 1912, in order that he may complete certain promising lines of work which he is now engaged upon.

Proposed Publicity and Special Purposes Fund.—A Committee, consisting of the Council, the Publicity Committee of the Commercial Sections of District Associations, and other members of the Institution, have under consideration the establishment of a fund for extensively advertising the advantages of gas for domestic and industrial purposes, and partly for research and investigation work in the interests of the industry. A circular has been issued to all gas undertakings in the kingdom, inviting contributions to the fund for a period of at least three years, on the basis of 2s. 6d. per million cubic feet made. Substantial promises of financial support have been received in response, and a well-attended conference of representatives was subsequently held, at which the scheme was fully explained and discussed—a resolution heartily approving of it being passed; the principal question left for the Committee's further consideration being that of the amount of the subscription. It is hoped when this is decided that the scheme will, by the general support of the whole industry, speedily become an accomplished fact, enabling much needed work to be at once entered upon.

Unification of Gas-Threads.—Here follows the full text of the report by Mr. James W. Helps of the third session of the International Commission on the Unification of Gas Screw-Threads appointed by the Société Technique du Gaz en France, which was held in Paris on Oct. 19 and 20, 1910.

Third International Road Congress.—An invitation was received from Sir George S. Gibb, Chairman of the Road Board, for the appointment of representatives of the Institution to assist in the consideration of preliminary arrangements for the holding of the Third International Road Congress in London in 1913; His Majesty's Government having sent an invitation to the Permanent International Association of Road Congresses to hold the Congress of 1913 in London, on the understanding that an Organizing Committee representative of all interests concerned will undertake the arrangements for the Congress. Mr. Charles Carpenter and Mr. S. Y. Shoubridge were accordingly appointed, and attended a meeting on the 3rd of May last, held at the Institution of Civil Engineers, when the Organizing Committee was formed, and other business transacted.

Standard Specification for Street Lighting.—The Councils of both the Institution of Electrical Engineers and the Illuminating Engineering Society have appointed Committees for the purpose of considering the issue of a standard specification for street lighting. The Institution of Electrical Engineers, in constituting their Committee, invited the co-operation of the Council of the Institution of Gas Engineers, the Institution of Municipal and County Engineers, and the Illuminating Engineering Society. It was recognized that there would doubtless be points of detail which each interest might have to consider individually before a collective agreement could be arrived at; but it was suggested that joint discussion at a preliminary conference might be of service in saving time.

In response to the invitation, the Council appointed, as representatives of the Institution, Messrs. W. Doig Gibb, S. Y. Shoubridge, and Robert Watson, to confer with other delegates in the matter generally; any draft specification prepared to be ultimately submitted to the various bodies concerned, for approval or otherwise. Several joint meetings have already been held. The first point discussed had regard to the unit—either of the light of the source (as expressed in candle power) or of the illumination received (as indicated by foot-candle values)—which should form the basis of contract. Following the general feeling in favour of the latter, the method of measurement was subsequently debated. Differences in opinion occurred as to the relative advantages of tests respectively made on the horizontal plane and at right angles to the light rays. Though in a minority, the Institution's representatives strongly advocated the latter method.

The further matter of classification of illumination requirements according to the relative size and importance of streets is also under discussion.

ALEXANDER WILSON, *President.*
WALTER T. DUNN, *Secretary.*

May 26, 1911.

[Appended to the report is a list of the additions made to the library during the year, for which the Council express their thanks; also the statement of accounts and balance-sheet for the year ended Dec. 31, 1910, duly certified by the Auditors, Mr. James L. Chapman and Messrs. Wood, Drew, and Co., and a list of contributions to the Special Purposes Fund, amounting to £356 18s. 6d.]

Report of the Benevolent Fund Committee.

The Committee report that during the year ended Dec. 31, 1910, the amount of £333 18s. 1d. was received. Subscriptions produced £175 18s.; donations, £40 19s.; interest on investments, £105 10s. 5d.; and income-tax refunded, £11 10s. 8d. The expenditure amounted to £320 13s. 1d.; £296 15s. having been granted in the relief of fourteen necessitous cases, and £23 18s. 1d. expended for printing and stationery, postages, and bank charges. The Committee report that while some new subscribers were added during the year, others were unfortunately lost by death; and they point out that there are still a large number of members of the Institution who do not contribute to the fund. To these an appeal is made for assistance, to enable the good work carried on by means of the fund to be maintained and increased.

[The list of contributors for the past year and copy of accounts, duly certified by the appointed Auditors, Mr. James L. Chapman and Messrs. Wood, Drew, and Co., are appended to the report.]

Masonic.

The W.M. of the newly-consecrated "Murdoch Lodge," W. Bro. Charles Meiklejohn, of Rugby, has been designated by the Provincial Grand Master of Warwickshire as P.P.S.G. Warden of the Province.——At last Wednesday's meeting of the Evening Star Lodge, W. Bro. W. D. Child, P.P.G.St.B., Essex, who recently resigned membership, was presented with a handsome diamond ring as an acknowledgment of his services for many years as Secretary of the Lodge.——The Installation Meeting of the Northern Star Lodge, No. 3053, was held at the Midland Hotel, Manchester, last Friday, when Bro. Harold Barker, of Buxton (who had been advanced from the position of Junior Warden, in consequence of the death of the Senior Warden, Bro. G. B. Smedley), was placed in the chair, after an impressive ceremony, in which the retiring Master (W. Bro. John Mackay) and several of the Past Masters took part. The officers of the Lodge for the year 1911-12 will now be:

W. Bro. H. Barker (Buxton)	W.M.
W. Bro. John Mackay (Bradford)	I.P.M.
Bro. Fred J. West (Manchester)	S.W.
Bro. S. Meunier (Stockport)	J.W.
W. Bro. R. Surtees (Fenton)	Chaplain.
W. Bro. Walter Whatmough (Heywood)	Treasurer.
W. Bro. R. G. Shadbolt (Grantham)	Secretary.
Bro. T. W. Jordan (Stockport)	S.D.
Bro. James M'Ewan (Manchester)	J.D.
W. Bro. J. W. Broadhead (Elland)	D.C.
W. Bro. John E. Williams (St. Annes-on-Sea)	Organist.
Bro. E. O. Watson (Rawmarsh)	Asst. Secretary.
Bro. E. J. Wellens (Hebden Bridge)	I.G.
Bro. John Bond (Southport)	Stewards.
Bro. Lawrence Hislop (Uddingston)	Stewards.
Bro. W. B. Hudson (Manchester)	Stewards.
Bro. T. Brown (Matlock)	Stewards.
W. Bro. J. W. Scott (Stockport)	Charity Representative.

In the account of the visit of the Midland Association to the Nottingham Gas-Works which appeared in the "JOURNAL" last week, the name of Mr. George Curtis, the Distributing Engineer, who has charge of the whole of the Woodborough Road stores, was, by inadvertence, not included among those of the Station Engineers present on the occasion.

The Water-Works Committee of the Aberdeen Corporation have selected Mr. Cecil H. Roberts, Water Engineer to the Corporation of Southampton, for the position of Water Engineer at Aberdeen; Mr. Lewis Mitchell, who was originally appointed, having, as already stated, withdrawn his acceptance of it. Mr. Roberts served his apprenticeship to Messrs. Fawcett, Preston, and Co., of Liverpool; and he has seen service in the Argentine Republic, as well as in connection with the South Staffordshire Water-Works, where he was Assistant to Mr. W. H. Hill, the Engineer. He was appointed Water Engineer at Southampton in July, 1908, as recorded in the "JOURNAL" at the time.

SOCIÉTÉ TECHNIQUE DE L'INDUSTRIE DU GAZ EN FRANCE.

THE THIRTY-EIGHTH ANNUAL CONGRESS—Marseilles, May 22 to 25, 1911.

REVIEW OF THE PROCEEDINGS.

THE Thirty-Eighth Annual Congress of the Société Technique de l'Industrie du Gaz en France was opened on Monday last week in the Salons Massilia, Marseilles, by M. Henri Marquisan, one of the Directors of the Gas and Electricity Company of the city, the President of the Society. Upon the platform were the Vice-Presidents—M. Boutan, Managing-Director of the Lyons Gas Company; M. Delebecque, Manager of the Lille Gas-Works of the Compagnie Continentale du Gaz; and M. Rouland, Managing-Director of the Paris Gas Company. About 260 members were present.

General Meeting.

The first business on Monday morning comprised the admission of new members (including as an honorary member the President of the Institution of Gas Engineers), the nomination of members of the Committee (one of those elected being M. Rolland d'Estape, the Managing-Director of the Marseilles Gas and Electricity Company), and the reception of the reports of the Committee and the Treasurer (M. Frère). The last showed that the revenue of the Society in 1910 was 69,152 frs. (£2766), and the expenditure 89,132 frs. (£3565). The latter included 8372 frs. (£335) for prizes and 1013 frs. (£41) for investigations and for the library. At the close of the year, the Society's capital amounted to 213,268 frs. (£8531), compared with 209,271 frs. (£8371) at the corresponding period in 1909—an increase of 3997 frs. (£160).

Opening of the Congress.

At the afternoon sitting, the Congress was formally opened by the President, who delivered his

INAUGURAL ADDRESS.

M. Marquisan's presidential address was divided into two main parts. In the first part, he considered what may be termed the internal interests of the French Gas Society, particularly in regard to the recent constitution of departmental committees; in the second part, he viewed external aspects, especially recent electrical developments, and their effect upon the position and prospects of the gas industry. We give a *résumé* of this instructive and interesting address, which was marked by both a broad and optimistic outlook over the technical fields of gas and electricity.

After the more or less inevitable and conventional exordium referring to the difficulties of the task of writing a presidential discourse, after so many presidents and so many years, M. Marquisan proceeded to examine the ideas which led to, and underlaid the formation of, the recently-created commissions (or departmental committees, as we have called them) of the Society. He first noted the importance of the presence on its Central Committee of representatives of gas groups—such as that of the Société du Gaz of Paris, and of the Société d'Eclairage, Chauffage, and Force Motrice. The example of the Syndicat Professionel (at whose monthly meetings are considered questions prepared by the committees of it), and of foreign gas associations, principally in England and Germany, was followed. The German Association of Gas and Water Engineers had had some special committees almost from its start over fifty years ago. They dealt with photometry, heating, meters, gasholders, and instruction and education, which, under the direction of Dr. H. and Dr. K. Bunte, at the Experimental Works at Carlsruhe, play so important a part in the teaching of gas engineers. In England, such committees are of more recent date. In 1909 was formed the Carbonizing Committee; and in 1910, the Refractory Materials Committee, to consider the standardization of bricks and retorts.

The French committees were formed on analogous lines; three dealing with the three great divisions of gas management—namely, manufacture, distribution, and application. Who has not been bothered in his works or as to his mains by some apparently secondary, but difficult, question? Colleagues are consulted, and often inconsistent replies are received. The committees will be the centres for such inquiries, will classify the information received, and will give replies from accumulated experience. Not less useful will be their task of preparing for the annual meeting, guiding the discussions, and determining the scope of the papers. The result of all this documentation and frequent interchange of views among members may be, it is hoped, the compilation of a modern general gas treatise, having French characteristics, and worthy to be placed among international gas literature.

One essential aim in the establishing of these committees was to assist the managers of small and medium-sized works, who necessarily have not the facilities of a large staff, but whose experience is none the less valuable, even to the heads of large gas-works. The committees will work for all, welcome all inquiries, and about which they will not dogmatize.

The Committee for professional instruction is next alluded to by the President, and the great difficulties of technical education touched upon. The contributions of Mr. Forstall, of New York, of Dr. H. Bunte, of Carlsruhe, and of Herr von Oechelhaeuser, of Dessau, are mentioned. The need of special instruction is increasingly obvious as the uses of gas extended, technical knowledge deepened, apparatus became more mechanical, and its handling more delicate. Some knowledge can only be acquired by practice, experience, and life on the works; but to what extent can such knowledge best be facilitated and brought about by previous gas instruction? What often happens to young engineers, provided with good general education and the culture of schools? Though the advantages of such preparation are never lost, there is sometimes a preliminary embarrassment, a passing hesitation in confronting the foremen and workmen under their orders. Willing chiefs have not always the time to give their pupils the necessary instruction. Some managers prefer themselves to train up their own staff, according to their own principles, rather than draw upon other schools. There would be no reason for this if there was a recognized course of instruction and an acquaintance with those who have the applying of it. M. Laurain, at the Ecole Centrale des Arts et Manufactures, has endeavoured to increase there the number of lessons devoted to the technics of gas. Foremen have also to be recruited and instructed. So with extending gas appliances, more numerous and better instructed gas-fitters are required now than formerly.

Nothing appears neglected in other countries to multiply schools for gas-fitters. It ought to be the same in France. Fitters and managers are concerned in the same standard. Then there is a large class of employees whose duties bring them into continuous contact with the public, and whose zeal, capabilities, and manners towards the public have so great an influence on the required good feeling between the parties. Mr. J. W. Helps's presidential address of last year is quoted with approval in this connection. Finally, the public has to be educated, by a propaganda of picture, poster, and pamphlet. In England there is a Publicity and Special Purposes Committee, "formed to organize a real agitation and a general movement," as the "JOURNAL OF GAS LIGHTING" of March 14 puts it. In Germany, there are groups "for the development of gas," to educate consumers, to dissipate prejudices against gas, and to take up its defence against unjustifiable attacks. This central committee is "like a vase into which one can pour discoveries, information, experience, and from which all can draw" ["Journal für Gasbeleuchtung," March 18 and 25, 1911]. Instructing ladies go from town to town, giving lessons and preaching the gospel of gas. In addition to this, there is the local work of calling on the clients, hearing complaints with good grace, and creating a favourable impression. The gas consumer, having now more to choose from, is naturally more exacting than formerly; but we also have, with improved appliances, the means of defending gas victoriously against any competition.

Turning to the Committee of Coal Analysis, this is important; and general rules should be adopted for measuring the commercial value of our coals and for comparing them. All these committees have only just begun work, and some delay is inevitable. They require encouragement and constant support.

Coming to the second division of the President's address, some observations are made on the progress of electricity. Since 1882 and 1888, when M. Albert Ellissen, a Past-President, made some eminently practical remarks on the attitude to be adopted towards electricity, it has continuously been watched, and its working taken over by an increasing number of gas undertakings. M. Godinet, the previous President, said last year that the branch, formerly grafted on without enthusiasm, would cause the tree to live which had adopted it. Good old gas, however, would long continue the main support of our undertakings. But the electrical industry extended its applications—lighting, traction, tramways, railways, motive power, metallurgy, chemistry, nitrogenous compounds, &c. Everywhere was a concentrated movement towards large central stations, hydro-electric or thermal, according to the district, and with increasingly large units of production—in the South-East of France, the Mediterranean coast, Dauphiné, Savoy, in the Pyrenees, Bordeaux, and part of the Centre, &c. Other large schemes are proposed at Nancy, Rouen, Nantes, and for harnessing the Rhône at its entrance into France for distributing electrical energy in Paris. Then there are coke-ovens and blast-furnaces in the east and north, at Boulogne, Calais, &c.

In the near future, a large part of France will be covered by the interlacing network of these distributing systems. Their advantages are: Reduction of first cost, increase of output, saving in labour, and strength of distributing administration. "How, in looking at these powerful organizations, ought we to safeguard our position? In what way is it altered in contrast with the former state of affairs, when the competition was within the circle of our urban concessions, and when the struggle was confined to the sphere of lighting, and often took on the special acuteness of local passions?" A phrase illustrates the situation: "The industry of electrical energy is clearly distinguished from that of electric lighting. The industry of electrical energy is to that of lighting as in business a large stores is to a particular article." Gas undertakings have already their organizations in the towns for the sale of the "particular article," which is lighting and power. We

have our clients, our knowledge of local conditions, and our commercial practice. We are, therefore, for electricity, useful auxiliaries, even associates. Each can derive advantage from the other, and the consumer first. There is nothing Utopian in this *entente* based on a community of interests. It has been put into practice by several undertakings which serve gas companies situated in their radius of activity. Conditions are not everywhere the same; and the struggle still exists in certain places, as there is as yet no Hague conference for conflicts of this kind, to disarm the belligerents, and to produce universal peace.

The Diesel engine is given as an illustration of the support to be rendered to central electrical stations, notably at Bucharest, where the low price of oil makes this engine particularly suitable. An interesting new feature is the arrangement now arrived at whereby heavy tar oils can be substituted for petroleum. At St. Chamond, there is one set of 1000 H.P. and a second of 2000 H.P. in course of construction. At Calais, the Cie. Française have put up a 500 H.P. Diesel engine which, with oil of a specific gravity of 1103 from the Lens Mines, has consumed 222 grammes at full load and 245 grammes at half-load per horse-power-hour. It has been feared that the extended use of these engines might cause the production of tar oils to be insufficient. But there are still coke-ovens to be changed into recovery plants; and gas engineers need fear rather the over-production of tar, and need not discard in practice the ingenious methods devised for the burning of tar in their producers.

Metallic filament lamps continue to spread, and their price to be reduced and their quality to be improved. It is difficult to say in what proportion their use has affected the consumption and the income of electrical undertakings. Researches continue to look for lamps of even less consumption and of more agreeable light—Moore lamps and Claude lamps based on the principle of the Geisler tubes. The resources of science are inexhaustible, and the progress of the electrical industry should keep us awake. It would be disquieting were it not that our industry shows parallel progress, and that each year sees characteristic developments in the consumption of gas, affording proof that it only depends on us for it to continue without interruption. Without mentioning heating and cooking by gas, which still leave a large field for activity, the adoption of powerful and beautiful gas lights for the public lighting of rich and frequented districts is evidence that it is not all in favour of one competitor. "And for other proof, there is the fact mentioned by one of our journals* that the Society of Medical Officers replaced electricity by gas for lighting, heating, and ventilation. It is true that this was in England—in London, at the offices of the Society of the Medical Officers of Health. Truth on that side; error on this. Happy country where water gas is not prohibited and where mixed gas is protected by the Faculty."

A pleasing incident of the afternoon's proceedings was the customary distribution of medals given by the Government to gas-works employees for long and meritorious services, of medals and premiums awarded by the Society for similar good conduct, and of the prizes offered by them for the best papers submitted at the Congress in Paris last year. There were 39 Government medals, and they were presented by M. Jardin, the Deputy-Mayor of Marseilles; the Prefect being unable to be present. The President expressed his regret at the absence of the representative of the Government, and voiced the sympathy of the members with them in the loss sustained by the regrettable aeroplane accident at Issy-les-Moulineaux the preceding day, which had deprived them of the Minister for War and seriously injured the Prime Minister. There were forty of the Society's medals, and of these seven were awarded to gas workers in Marseilles.

At the close of these proceedings, attention was turned to the technical business. The first matter to come before the members was an important report presented by M. Laurain, on behalf of the Technical Information Committee, giving particulars of what is being done in this direction in other countries. Then the papers, of which there were about thirty, were taken up. The translations of some of these are given in the present number of the "JOURNAL;" and the others will be dealt with in subsequent issues. M. Bonnet, a member of the well-known Continental firm of gasholder constructors, gave an account of the Hamburg gasholder accident, full particulars of which have already appeared in our columns. M. Laurain submitted the paper, given elsewhere, describing the system of condensing tar which has been adopted in the Paris Gas-Works as the result of the investigations carried out by M. Sainte-Claire Deville, the Chief Engineer at their experimental station at La Villette. M. Cornuault gave some interesting particulars in regard to what is being done in some of the coalfields in England, Germany, and America in the way of supplying coke-oven gas; and he also furnished statistics showing the increased use of gas in certain towns for culinary and heating purposes. Another valuable paper was by M. Ph. Delahaye, on the manufacture and use of carburetted water gas. The technical business occupied the members until half-past six o'clock on Monday, and the mornings and parts of the afternoons of Tuesday and Wednesday.

Visits to Works.

After the adjournment on Tuesday afternoon, the members visited the gas and electricity works, where they were received by M. Gustave Ador, the Chairman, M. Rolland d'Estape, the Managing-Director, and MM. Cornuault and Fabre-Luce, Directors. The Manager (M. Prat), his Assistant (M. Teulon), and the various Engineers (MM. Burguière, Stoss, Bargeton, and Bordier) conducted the large party over the establishment, showed them how the gas-works had been altered and modernized, and directed their attention to an installation of vertical retorts—the first of the kind in actual operation in France. The visit was made the more interesting by a preliminary description of both the gas and electricity works by M. Rolland d'Estape. On Wednesday afternoon, the members visited the important transformer station of the Société de l'Eclairage Electrique du Littoral Méditerrenéan at Allauch. These visits brought the business of the Congress to a close.

Banquets and Excursion.

On Monday evening, the members were entertained at a banquet given by the Marseilles Gas and Electricity Company at the Restaurant du Casino de la Plage. M. Gustave Ador, the Chairman of the Company, presided; and upon his left and right respectively were M. Marquisan and M. Jardin, the Deputy-Mayor, representing the Municipality. There was a large attendance of the notabilities of the city. In the course of his speech, M. Ador referred to the work done by the Company as an important public undertaking, and enumerated the improvements effected by them in the condition of their employees, especially in the matter of pensions. In conclusion, he accorded a hearty welcome to the President and members of the Société Technique. After a few remarks by M. Jardin, in which he emphasized the necessity of contracting parties faithfully observing the terms of their treaty, M. Marquisan also alluded to the work of the Company, spoke highly of the service rendered to it by M. Ador, and paid a well-merited tribute to his able colleagues at Marseilles. He proposed prosperity to the Company and their staff.

On Tuesday evening, the subscription banquet of the Society took place at the Casino de la Plage. M. Marquisan presided; and among the numerous company were M. Ador and M. Jardin, as well as several gentlemen occupying important positions in Marseilles. In the course of his address, M. Marquisan recognized the interest taken in the Congress by the Mayor of the city, in asking M. Jardin to represent him. He reviewed the progress of the gas industry in France, alluded to the awards made to the old servants of gas companies, and offered a few kindly remarks to the members of the Society attending the Congress. His speech was cordially received. M. Jardin, in the name of the Mayor, thanked the Society for having chosen Marseilles for holding their thirty-eighth annual conference. M. Piaton having made a few observations on behalf of the Professional Syndicates, M. Delebecque proposed "The Past-Presidents of the Société Technique." The toast was acknowledged by M. Cornuault, a Past-President, and the Managing-Director of the Marseilles Company, who spoke in warm terms of the services rendered by M. Marquisan. Two other toasts followed, and the pleasant function was brought to a close.

On Thursday, a goodly number of the members took part in the excursion which had been arranged to Hyères, where the members inspected the small, but interesting, works of the Société Lyonnaise des Eaux et de l'Eclairage.

Sudden Death of Mr. W. J. Jenkins.

A large number of our readers, particularly those who attended the meeting of the Manchester District Institution at Doncaster on Saturday, will be shocked to learn of the painfully sudden death yesterday morning of Mr. W. J. Jenkins, the head of the well-known Retford company bearing his name. He mixed and conversed with the assembled gas engineers and managers last Saturday apparently in his usual health; and at the luncheon given at the Mansion House by the Mayor and Corporation, he responded to the toast of "Kindred Associations," on behalf of the Society of British Gas Industries—he being Chairman of the Conveying Plant and Labour-Saving Machinery Section of the Society—with not the slightest indication that his active and useful life was so speedily to be brought to a close. Mr. Jenkins was perfectly well when he retired to rest on Sunday evening, but was unconscious when found the following morning and died (of cerebral hæmorrhage) in a few minutes. He was originally with West's Gas Improvement Company, Limited, of Manchester, and left their service to commence business as a contractor for the erection of gas-works plant. Of late years, he had been identified with the retort-house machinery of M. de Brouwer, who, apart from business connections, entertained for him the deepest feelings of friendship. Similar sentiments prevailed widely in the British gas profession, among the members of which Mr. Jenkins bore the character of a conscientious worker who possessed broad technical knowledge which he was always willing to place at the disposal of others. His death will be felt by many as a personal as well as a professional loss.

* See "JOURNAL," Vol. CXII., pp. 186, 718.

ADVANCES IN MANUFACTURE AND USE OF GAS.

By Dr. H. Bunte.

A lecture was delivered at the general meeting at Munich last year of the Association of German Chemists by Dr. H. Bunte, Professor of Chemistry at the Technical College at Carlsruhe. The lecture presents a review of advances to date in the manufacture and use of gas—the review being suited to the audience of scientific men not specially acquainted with the gas industry, to which it was addressed, but naturally not containing much matter of absolute novelty to gas engineers. It has, however, been published in its entirety in the last number to hand of the "Journal für Gasbeleuchtung;" and the following summary of its contents has been prepared from that source.

Erroneous views on the position and development of the gas industry, which prevail in many circles, may be dispelled by reference to statistics that show that in no previous period has the increase in the number of gas-works and in the consumption of gas been greater than in the decade which has just closed. Dozens, yea, hundreds, of small towns and localities which previously had no central supply of light and power have been provided with gas; and in many places in which current was supplied from electricity works, gas-works have now been erected. Country people have been provided with gas through the extension of the area supplied from towns or through the combining of a number of communities for the establishment of a central gas-works; so that there is now a rapidly increasing number of places supplied with gas from a distance or across country.

Broadly, the amount of gas consumed in Germany has doubled in the last ten years. In the year 1898, 6463 million cubic feet of gas sufficed for the supply of Berlin; the latest returns show a total consumption of 11,550 million cubic feet. The consumption per head of the population has increased from 2500 to 5500 cubic feet per annum. This remarkable result has been achieved notwithstanding the magnificent supply of electric current in Berlin. The same grand development of gas supply has taken place both elsewhere in Germany and also in other countries. There is no sign of an impending retrogression or of a supersession of gas supply by electric current. The external development thus indicated has its complement in the great strides which have been taken, both chemically and mechanically, in the perfecting of the gas industry from the technical standpoint.

The introduction of the Welsbach light in 1891 effected a revolution which resulted in the old flat-flame and argand gas-burners being reduced to a negligible quantity. The mantle gave the Bunsen burner predominance in the whole field of the use of gas for both lighting and heating. The exclusive use of gas, thus rendered non-luminous in the Bunsen burner, has given freer scope in methods of gas manufacture, as it is no longer necessary to produce a gas from costly raw materials in small retorts in order that a strongly luminous flame should be obtained from it on combustion. The object of the carbonization of coal is now to recover as much as possible of its heating power in the gaseous form.

With a view to further progress in gas manufacture, experimental works have been erected in Carlsruhe, Leeds, and Vienna. The Carlsruhe works, which is under the auspices of the German Association of Gas and Water Engineers, has in the first place undertaken a comparative investigation of German coals by studying seventy different varieties from the most important coalfields —viz., those of Rhenish Westphalia, Saar, Saxony, and Silesia. An experimental works was established somewhat on the same lines in Munich thirty years ago for investigating on a large scale the heating power of coals. The Carlsruhe works are concerned with the somewhat kindred problem of ascertaining the proportion of the heating value of the coal recoverable in the gaseous form. The unit of heat in the form of gas fetches about ten times the price of a unit of heat in the form of coke. The calorific value of coal, when subjected to dry distillation, is recovered in the products almost without loss.

A number of investigations made at the Carlsruhe works show that the loss of calorific power on dry distillation ranges from 0 per cent. to about 6 per cent. of the calorific power of the coal, a variation which is almost wholly accounted for by the experimental errors. Thus carbonization is a process by which the value of the coal is increased. There is, however, the consumption of fuel in maintaining the heats of the settings; and this consumption is equivalent to from 10 to 12 per cent. of the calorific power of the coal. Otherwise the process runs without loss, and about two-thirds of the weight of the coal is recovered as coke, which burns without soot or smoke, and about one-fourth of its weight as a valuable heating gas. About 90 per cent. of the calorific value of the coal is recovered in these two products, while some 8 per cent. is found in the tar. The figures are of very great economical and hygienic significance. The motto to be adopted in combating the smoke nuisance should be: "Heat with coke; cook with gas."

In regard to coal-gas manufacture, there are two new characteristic types of setting—viz.: (1) The Munich inclined large carbonizing chamber, as used at the Dachauerstrasse works in Munich; and (2) Dr. Bueb's Dessau vertical retort, as now constructed by Mr. Körting, of Berlin. The vertical position of the latter retort and the 10 to 12 hours' carbonizing time constitute radical departures from the earlier methods of carbonization. The other line in which advance on the earlier methods has been made is the adaptation of the coke-oven, as accomplished by Herr Ries. His carbonizing chambers have inclined bottoms; and the carbonizing period is twenty-four hours. The chambers effect a very great economy in labour. For the 3½ million cubic feet of gas, which is the average daily production in Munich, 2376 chargings and dischargings of the old retorts would have been required, while the new carbonizing chambers, of the same productive capacity, only have to be charged 120 times. Further technical advantages of the new types of setting are the reduction in the formation of naphthalene and an increased production of ammonia, and improvement in the quality of the coke. The working of vertical retorts with steaming further admits of an increase of 12 to 17 per cent. in the output of gas.

In other countries, improvements in other directions have been made. English engineers have been particularly successful in improving machinery for charging and discharging horizontal and inclined retorts, and have devised vertical retorts for continuous or semi-continuous coal carbonization. In the continuous process of Woodall and Duckham, broken coal is continuously introduced by machinery into vertical retorts, and the coke is likewise withdrawn by mechanical means. In the semi-continuous process, larger quantities of coal are introduced, and the coke is withdrawn at short intervals in the same way, as is done in the distillation of shale in Scotland or lignite in Germany. At the time of speaking, these very interesting processes have scarcely passed beyond the experimental stage, but have served to indicate the general attention which is being given to questions of carbonization.

The gas-works' plant for the mechanical and chemical purification of the crude gas is of less technical and economical importance than retort-settings; but improvements have been made in it also. Instead of purification with dry oxide, Burkheiser and Feld have introduced interesting wet purification processes, which effect considerable economy in space and simplification in working. These processes are at the present time being tried on an extensive scale at Hamburg and Königsberg.

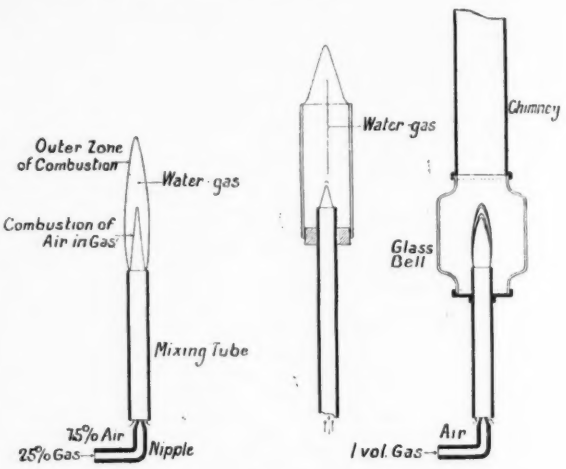


Fig. 1.—Flame of Burner. **Fig. 2.—Splitting-up of Flame.** **Fig. 3.—Lucas Lamp.**

The use of gas has been extended through the general employment of the Bunsen burner, which was first applied in the fifties of the last century by its inventor in the chemical laboratory at the University of Heidelberg. Its forms, modifications, and applications are now legion. About half the gas produced in Germany is now directly employed for heating purposes. The most important and interesting elaboration of the Bunsen burner has, however, taken place in connection with its application to incandescent lighting. The phenomena of the Bunsen flame may be briefly referred to in order to explain its use for incandescent lighting. Figs. 1, 2, and 3 will serve to elucidate the explanation. After the gas injected at the nipple has mixed with the air which it draws into the mixing-tube (fig. 1), two sharply defined cones are observable in the flame at the top of the mixing-tube. The inner green cone shows incomplete combustion, or the combustion of air in an excess of gas. The outer combustion zone is that in which the products of incomplete combustion—viz., water gas diluted with nitrogen—are completely burned by the oxygen of the air.

The two zones of combustion can be separated by the method of splitting up the flame shown in fig. 2. This admits of the ready examination of the products of incomplete combustion. If larger quantities of air are mixed with the gas before combustion, as in the case of a blast flame, the flame becomes reduced in size, the two cones more nearly coincide, and the heat of combustion is developed in a smaller compass, so that the temperature is naturally raised. When the surfaces of the two cones as nearly as possible coincide, the whole of the heat of combustion is developed in the smallest compass (fig. 3). When a mantle corresponding

in shape to the flame is brought into the outer fringe of a Bunsen flame, it is raised nearly to the temperature of the flame; the difference being only the loss due to the abstraction of heat by radiation.

All other things being equal, the mantle will be the hotter the smaller is the flame, and the greater the concentration of heat. The light of the mantle is almost solely a question of temperature, the radiation of heat increasing with the fourth power of the absolute temperature, and the radiation of light with about the twelfth power. A small rise in temperature of the Bunsen flame or mantle, therefore, effects an increased radiation of heat, but at the same time an incomparably greater increase in the light radiated. These relations may be made clearer by reference to fig. 4, which shows, according to Lummer, the distribution of the

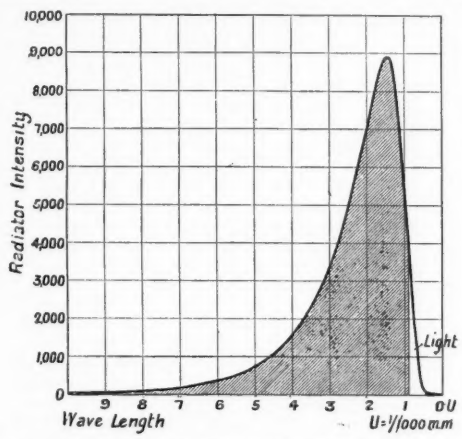


Fig. 4.—Distribution of Radiation Energy of a Black Body at 1728° C. in the Heat Sprectrum.

radiant energy of a black body at 1728° C. The shaded area enclosed within the curve represents the invisible heat radiation, while the unshaded portion also enclosed by the curve between the wave lengths 0·4 and 0·75 μ corresponds to the light radiation, to which only our eyes are sensitive.

It will be seen how small a proportion at this temperature the light radiation bears to the invisible heat radiation of long wave lengths. The maximum radiation falls between the wave lengths 1 and 2 μ, or far beyond the visible portion of the spectrum. When the temperature is increased, however, there occurs a shifting of the maximum of radiant energy to smaller wave lengths.

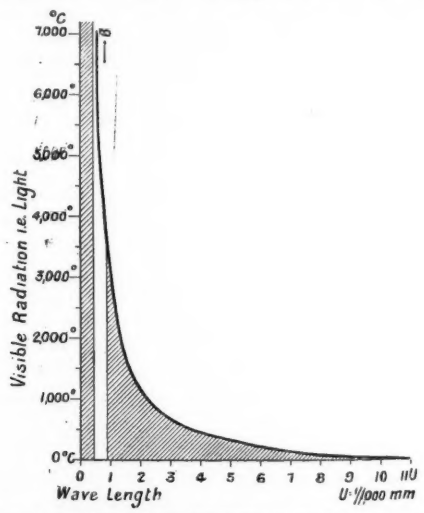


Fig. 5.—Shifting of the Maximum of Radiation Energy as the Temperature Rises.

According to Wien, the maximum radiation coincides more nearly with the visible portion as the temperature rises, and between 3000° and 4000° C. would fall entirely in the visible portion of the spectrum (fig. 5). The advantage that has been taken of the laws of radiation in the improvement of the incandescent gas light, by which increased temperatures of the Bunsen flame have resulted in better lighting efficiency and in greater economy of the lamps, is shown in the following table:—

	Candles per Cubic Foot per Hour.
Upturned mantles—	
Year 1900	14·9
,, 1905	16·9
,, 1910	25·3
Inverted mantles—	
Graetzin and Welsbach burners, about	30
Low-pressure inverted lamps	36·2
High-pressure gas-lamps	50
Lamps with high-pressure air supply	50

Theoretically, the means by which the temperature of the flame is raised are simple—viz.: Concentration of the heat, diminution of the flame by appropriate mixing of the gas and air, and pre-heating of the elements of combustion. The practical solution of the question, however, presents very great difficulties, which nevertheless have to a large extent been overcome both with small burners and in the large high-pressure gas-lamps which rival the electric arc lamp in illuminating power. The generally-used upright Welsbach burner, with gas at 12-10ths to 16-10ths pressure, draws in about three volumes of primary air to one of gas, so that the mixture which issues from the burner consists of 25 per cent. of gas and 75 per cent. of air. As 5 to $5\frac{1}{2}$ volumes of air are required for the complete combustion of one volume of ordinary coal gas, a supplementary or secondary supply of air is necessary. The more the air which is mixed with the gas before combustion, the less the secondary supply of air requisite for combustion, and the smaller the volume or compass of the flame. The supply of primary air can be increased in one of three ways —viz., (1) by causing the gas to issue at high pressure, say 40 to 80 inches of water, so that it draws in more air; (2) by blowing air in artificially; (3) by sucking in more air by superimposing a chimney. The Lucas lamp (shown in fig. 3) acts in the latter way; high-pressure gas-lamps in the first way; and compressed-air gas-lamps in the second way.

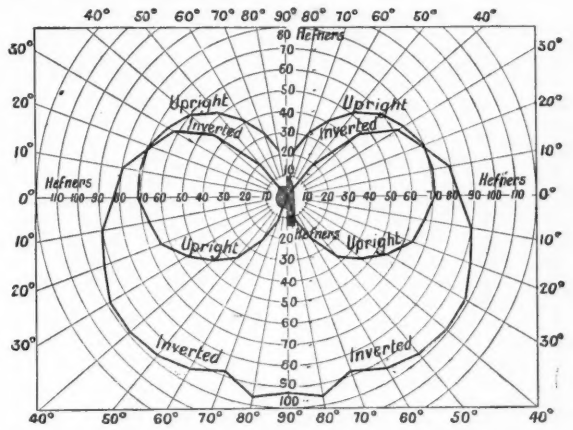


Fig. 6.—Distribution of the Light of an Upturned Welsbach Burner (without Shade) and of an Inverted Incandescent Burner.

The upright incandescent gas-light sends out the greater part of its light rays in the horizontal direction, and has to be provided with a reflector when the floor has to be lighted. The inverted burner acts better for such lighting purposes. The distribution of light by the upright burner without a reflector and by the inverted burner is shown in fig. 6. The light-radiation of the inverted burner has been improved in a simple manner by pre-heating the air and gas by the aid of the heat of the gases escaping from the flame. Figs. 7 and 8 show that the brightness of the inverted

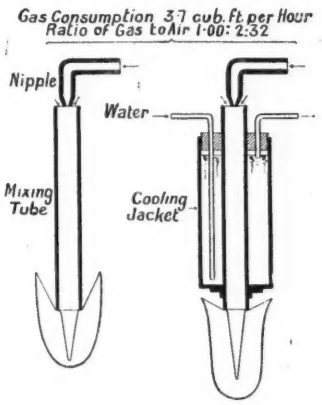


Fig. 7. **Fig. 8.**

light when the gas and air are heated is very much greater than when they are kept cool, and that the surface of the flame is smaller and the combustion intensified in the former case. When by the use of compressed air or of high-pressure gas intensified combustion in the smallest compass is attained, the lighting duty of inverted burners is greatly increased, and 35 cubic feet of gas per hour suffice to maintain a light of about 2000 Hefners or (say) 1800 candles. To what extent further economy may be achieved cannot be predicted; but both in regard to amplitude of light and efficiency the incandescent gas-light now stands at the head of all means of lighting.

There is still much to be done in the direction of providing distance-lighters which shall give gas all the convenience of self-lighting possessed by electricity. Notwithstanding the many

practicable distance-lighters now available, and the incentive given to their employment in Germany by the imposition recently of a tax on matches, there is a wide field for improvement in this direction, and the reward awaiting the successful inventor is a rich one.

After a brief allusion to the use of gas for power purposes, attention may be called to the employment of coal gas for filling balloons and air-ships—a use which dates from the year 1783, when Minckelers filled a balloon with coal gas for the Duke of Aremberg. But coal gas has a specific gravity of about 0·4, as compared with 0·07 for hydrogen; hence the latter has a much greater lifting power, and is naturally used in modern air-ships despite its greater cost. About twenty years ago, the author proposed to aëronauts that coal gas, which already contains 50 per cent. of hydrogen, should be rendered lighter by superheating it to 1100° to 1200° C. in the presence of incandescent coke. The hydrocarbons are thereby split up into carbon and hydrogen, and an increase in volume is secured. The author's proposal was that coke in a furnace should be raised to incandescence by an air-blast, and that then the "blow" should be stopped, and the coal gas passed through the bed of coke until the latter had been cooled, when another "blow" would be made. The working would be intermittent—like that of water-gas manufacture. Lately experiments have been made by Herr von Oechelhaeuser at the Dessau Gas-Works, and the difficulties presented by the process have been overcome. A gas containing about 80 per cent. of hydrogen is produced at but little higher cost than that of coal gas, and numerous balloons have been filled with it. There are other processes for producing hydrogen cheaply—some take water gas as the raw material. Coal gas also may be employed as the starting-point, according to a process patented by Mond and Langer in 1889. Using metallic nickel at a red heat as a catalyzer, the heavier constituents of coal gas are split up and the resultant bodies combined with water, so that the ultimate products are only carbonic acid and hydrogen, the former of which may be readily removed—*e.g.*, by lime. But reversal of the reactions also occurs, and no practical result has been obtained from this process when tried in the author's laboratory. It may also be mentioned that Frank and Caro, in conjunction with the Lindé Company, are working a process for the separation of hydrogen from water gas by fractionation. Advantage is taken of the fact that liquid carbonic oxide boils at −190° C., whereas liquid hydrogen boils at −252° C. The carbonic oxide is recovered as a bye-product of this process. Hydrogen is useful not merely for air-ships, but also for the autogenous soldering and cutting of metals.

Enough has been said to show that in connection with gas supply there is still ample scope for physical and chemical research, which should prove of the greatest industrial value and be well rewarded.

A DAY IN EXETER.

A THOROUGH success was the unanimous opinion expressed on their return by the large number of members of the London and Southern District Junior Gas Association who last Thursday journeyed down to Exeter on the invitation of Messrs. Willey and Co., Limited, the well-known gas engineering firm of that city. For one thing, the utmost possible had been done by the hosts to make the outing enjoyable, as well as instructive; and, for another, the weather—always an important consideration in connection with functions of this character—was kind. In fact, it was an ideal day; and the city was seen in its most attractive aspect. Of course, a somewhat large amount of railway travelling was necessary; but the reward was ample. Indeed, such were the impressions made on the visitors, that Exeter will with them be always a happy memory. It was a big gathering that assembled to take part in the day's proceedings. It included the Mayor of Exeter (Mr. Alfred T. Loram), and the Sheriff (Mr. J. G. Owen). Then, in addition to the London contingent, a number of other gentlemen connected with the gas industry had accepted invitations to attend. Among them were Mr. Norton H. Humphrys, of Salisbury; Mr. W. P. Tervet, of Devonport; and Mr. J. T. Foster, of Exmouth. A further gratifying feature was the presence of about fifteen members of the South Devon and District Junior Gas Association. Finally, there were those whose names are mentioned below (and others) who had charge of the visitors during the whole or some portion of the day, and who were all indefatigable in their efforts to impart information. Perhaps it may be explained here that the South Devon Junior Association is a comparatively young organization, having only been started last year. The President is Mr. W. E. Dean, of the Torquay Gas Company; and he received a very warm welcome from his old friends in the London and Southern Junior Association, who were deprived of him some five or six years ago (at the time when he was occupying the position of Senior Vice-President), on his leaving the Tottenham and Edmonton Gas Company to take up his position in the West of England. This new Junior Association consists of 35 members; so that, considering the locality, it may be said to have made a good start.

This brief account of what was done on Thursday may begin with the arrival at Exeter Railway Station, where the members (headed by their President, Mr. L. F. Tooth, of the Commercial Gas Company) were met by the following gentlemen representing Messrs. Willey and Co.: Messrs. S. Simpson, A.M.I.Mech.E., T. Glanfield, and H. J. Weslake (Directors), Mr. George Lane (Secretary), Mr. F. T. Clapham, M.I.Mech.E. (Chief Engineer), and Mr. R. J. Rew, A.M.I.Mech.E. (Engineering Representative). A move was then at once made to the famous cathedral, where the party (who were here joined by Mr. F. Templer Depree, J.P., the Chairman of Messrs. Willey and Co.) were received by the Venerable Archdeacon Sanders, who kindly conducted them round and pointed out some of the most noteworthy features. As much time as could be spared—but unfortunately not nearly sufficient in which to see and admire all its beauties—having been spent in the cathedral, special trams which were in waiting conveyed the visitors to Messrs. Willey and Co.'s works, where light refreshments were partaken of.

The Gas-Works.

From here it was but a few steps to the gas-works, an inspection of which had been arranged, by permission of the Chairman and Directors. The visitors were welcomed by Mr. W. N. Westlake (the Manager and Secretary of the Exeter Gas Company), who proceeded to show them round and explain the different points of interest—a good work in which he was assisted by Mr. Fred Wood, the Works Manager. It may be remarked that the works are conveniently situated on a site of between 9 and 10 acres in the south-west of the city, with the canal communicating with the River Exe on one side, and the Great Western Railway on the other. Sidings connect up the main line, and also run out to the wharf. The Company use their own locomotive on the works, and for running trucks out to the wharf for unloading coal, which is brought by steamers and sailing boats. The plant generally was inspected, including the two retort-houses, which contain eleven beds of retorts with regenerators and five beds with generators, all hand charged, and capable of producing some 1¾ million cubic feet of gas a day.

The coal-stores are situated around three sides of the retort-houses; and over these is a Telpher transporter for handling coal. This, it may be safely said, was the principal item of interest to the visitors, who were afforded an opportunity of witnessing the operation of the plant. The track is 43½ feet from the ground, and is supported by a lattice girder and trestles, forming spans of 65 to 85 feet. There are two tipping-pits to receive the coal from the railway trucks. The Telpher cab is of the usual pattern, with the bogie in front, to which is attached a 1-ton "Hone" grab. This grab picks up the coal from the pits, and delivers it to any point of the coal-store through sliding covers and lifting doors in the roofs. It can, of course, take the coal out of the store again, if desired. The total length of the track is 840 feet, and the capacity of the plant is 20 tons per hour over a 600-feet run measured out and back from the tipping-pits. The generating plant consists of a gas-engine, direct coupled to a Siemens compound wound generator, giving an output of 22 kilowatts. One man is sufficient to drive the Telpher and attend to the generating plant. The trucks are tipped by the engine driver and shunter. The contractors for the plant were Messrs. Strachan and Henshaw, who sub-let the steelwork to Messrs. Willey and Co.

This latest addition to the plant has so far proved a great boon. Mr. Westlake believes it is the first Telpher transporter installed for handling coal, though, of course, there have been many erected for dealing with coke. It has only been working for a few months; but, judging from this short experience, it has been a complete success. Better results are being secured, owing to the fact that he is now able to systematically mix the coals. Previously hand discharging was in vogue; and the coal had to be stored as it came in. In this way, when coal was used out of store, they got the same coal day after day until another sort was reached. Now, of course, it is possible to mix it scientifically; and experiments are being made, to arrive at the precise mixture which will give the best results with the existing plant.

In connection with the remaining plant, it is only necessary to mention that there are four gasholders, giving a storage of 1,680,000 cubic feet; the largest, erected in 1898, having a capacity of 770,000 cubic feet. The Company possess complete workshops, fitted with circular-saws, steam-hammer, lathes, drilling-machine, and forge; and they carry out all their own repairs.

Before leaving the works, Mr. J. G. Clark proposed a hearty vote of thanks to Mr. Westlake for his kindness to them. The visit had, he said, been looked forward to for a long time; and they had seen one or two things which were extremely interesting—especially the method of handling the coal. Mr. C. Tanner seconded the vote, which was cordially agreed to. Mr. Westlake, in acknowledgment, said he had been extremely pleased to see the members; and it was a great pleasure to show them round the works. It was always gratifying to get in touch with one's colleagues in the industry. They were not competitors with one another in the ordinary sense of the word, all having their own definite areas; and there was a brotherhood among those connected with the gas industry which was not to be found in some other branches of commerce.

Messrs. Willey and Co.'s Works.

The works of Messrs. Willey and Co. next received attention; and here, again, the visitors found much to interest them. The works, it may be remarked, are entirely self-productive—that is to say, everything is made on the premises from the raw material. The importance of the business to Exeter will be gathered, when it is pointed out that the number of employees is upwards of 800; the wages bill being from £1200 to £1600 weekly. Nothing seems too large or too small for the firm to undertake—the range

being from the smallest gas-fittings and meters up to complete gas-works, and including also constructional steelwork, castings, and many other side-lines of engineering. As a matter of fact, Messrs. Willey and Co. have erected complete gas-works plants in all parts of the kingdom; and among their enormous output of different appliances must be mentioned their particular pattern of prepayment meter, which is an improvement of Mr. Stephen Simpson, one of the Directors.

The inspection began with the huge and excellently equipped meter shop, where the visitors spent some time watching the work performed by men and machines on various sized meters. The tinplate of which ordinary meters are made is cut in guillotines to the required sizes. An ordinary meter contains forty separate pieces of tin plate. When cut out—and where necessary stamped in presses—the pressed parts are passed to the case makers, whose duty consists in soldering them together, and so making the case. The valve parts are made separately by other workers, and are afterwards fixed in position—an operation requiring the greatest exactness and cleanliness. The diaphragms of the bellows are made of Persian sheepskin; and these, when secured by special machinery to wire rims, are soaked in a preservative of almond oil, which also assists the easy action of the bellows. The bellows and money and index boxes, which are each made separately, are fitted into position, and the automatic attachment inserted. Pressure tests are then made, with the object of discovering any leakage, and to ensure the meter registering correctly before being finally enclosed and soldered up, after which it is again tested for steadiness of light, and "flared" in case the slightest leak has been overlooked. The number and badge having been affixed, the meter passes to the Government office for the official test and seal.

Going through the meter-stores, where quantities of meters of all sizes were being prepared for dispatch, the party were conducted to the foundries. These are equipped with two rapid cupolas of the latest type, and several electric travelling cranes, and are divided into two sections. In one, heavy castings up to 5 tons weight are made—such as purifier plates, standards, pipes, and meter cases (one of these, 10 feet in diameter, being in course of moulding). In the second section, small stove parts and other light castings are made. The brass foundry is necessarily a busy department, for here thousands of small parts for brackets and pendants, in many designs, are made. From the foundries, the work is despatched to the different departments—the japanners', finishers', and machine shop, according so its character and purpose. The latter shop is equipped with all that is best and modern. The high-speed tools comprise twist and other lathes, slotting, milling, boring, planing, and drilling machines. There is also a press for stamping out meter parts at one operation.

The brass finishing department is a large building 100 yards in length; and here numbers of men and machines are at work on component parts of gas brackets, pendants, &c., as well as main cocks, and steam and high-pressure cocks. A feature of this shop which was much remarked upon by the visitors is the splendid automatic machinery.

Among other departments inspected was the gasholder shop, which is also well equipped with modern tools of all kinds. In the yard were laid out tank bottoms for two large holders now on order, together with the top of another one, purifier covers, coke-bunkers, and a great deal of other work. In the engineering machine shop was to be seen a twin set of purifiers fitted with the "Pickering" patent valve; while stacked up ready for despatch were several hundred purifier plates, all accurately machined on the tools used for this purpose, together with a quantity of other gas-works plant. Two sets of "Pickering" valves were laid out, and afforded the visitors an opportunity of inspecting the interior working of this arrangement.

A point about the works which was commented upon is the excellence of the conditions under which the employees work; ample area and light being a characteristic of the different shops. Gas-engines driven by town gas are employed all over the place; and the works are lighted by means of electricity generated by the firm's own plant. Before leaving, the members saw the spacious suite of offices, on the ground floor of which are rooms for the correspondence and ledger clerks and the private rooms of the Directors, with the Chief Engineer's and drawing office above. The works of the Vulcan Stove Company, where cookers, fires, &c., are made, also received attention.

A Dinner.

The inspection over, the special trams were again requisitioned, and the party were conveyed to the Rougemont Hotel, where, to the number of about 120, they sat down to dinner. The chair was taken by Mr. Depree; and the Mayor, the Sheriff, and Archdeacon Sanders were also present. A short toast list was gone through.

After the health of "The King" had been drunk, the Chairman remarked that they had not had an opportunity of thanking the Archdeacon of Exeter for the admirable description he had given them of the cathedral; and he was therefore going to propose the toast of "The Bishop and Clergy of the City of Exeter," coupled with the name of Archdeacon Sanders. This was responded to by the Archdeacon.

The Chairman then proposed "Success to the London and Southern District Junior Gas Association," coupled with the name of the President, Mr. L. F. Tooth. He said that he and his co-Directors were much gratified at seeing so many members present. Learning from the President that one of the objects of the Association was to visit whatever gas-works they might happen to be near, he approached the Chairman and Directors of the Exeter Gas Company; and they very readily extended an invitation to the members. The visit to the gas-works, he was sure, had been one of special interest; and they had been received by Mr. Westlake with the greatest possible courtesy. There were certain points in connection with the works which perhaps differentiated them from others the members had visited. He thought the Telpher they had seen was one of the newest methods of dealing with coal that had been adopted by any gas company in the country. The Telpher had been used in various ways; but he did not think before its introduction in the Exeter Gas-Works it had been employed particularly for coal handling. The members were greatly indebted to their President for the trouble he had taken in bringing about what it was hoped had been a successful day.

Responding, Mr. Tooth said he knew the members were entirely in agreement with him that the whole of the day's arrangements had been most successful; and the credit for this belonged to Mr. Depree. All the visits had been extremely interesting, and had served the main object of the Association—which was education. They were deeply indebted to Mr. Depree, his co-Directors, and all who had assisted to make the outing so successful. They were honoured by the presence of the Mayor and Sheriff of Exeter. He mentioned that Mr. Liberty, Mr. Upton, and Mr. Farquhar had written regretting their unavoidable absence.

Mr. G. F. Morgan proposed "Prosperity to the City of Exeter;" mentioning that the day had been a most enjoyable one. The Mayor responded; remarking upon the importance of the firm of Messrs. Willey and Co. to Exeter. He said that there had been at the head of the business benevolent-minded men who had served the city well. The late Mr. Willey, who was called away all too soon, was much beloved by the citizens; and they were all proud also to acknowledge the present Chairman as a public man in Exeter. Mr. Depree had served the city for many years; and the chief honour it could confer upon him was overdue, and could not long be kept from him. The citizens were glad to know that in their midst were men who possessed the inventive genius which would maintain the firm in the high position it had attained. He congratulated the gas industry on having held its own against a very formidable competitor. While of recent years the electric light had progressed, he ventured to think gas had progressed even more.

The final toast "Prosperity to Messrs. Willey and Co.," coupled with the name of Mr. Depree, was proposed by Mr. J. G. Clark, who remarked that they had not before seen so many different kinds of gas-works appliances being manufactured under one roof. The toast was drunk with musical honours, and the Chairman, in response, said that his was one of the few firms who endeavoured to combine in their works all that was necessary to establish a gas-works—from burner to gasholder. He could only hope that the visit had been one which the members would look back upon as both instructive and enjoyable.

High-Pressure Gas v. Electric Lighting in Paris.

In the "Journal de l'Eclairage au Gaz" for the 5th inst., M. André Grebel gives an illustrated description of the high-pressure gas lighting on the Boulevard Raspail, in Paris, on the lines of his contribution to the "Génie Civil" which was noticed in the "Journal" for the 28th of March. At the close of the article, he makes some interesting comparisons of the cost of high-pressure gas and electricity for the installation in question. He puts the annual cost of the 116 gas-lamps at 79,040 frs., and the interest and sinking fund charges at 16,500 frs. (the latter based on the Charlottenburg installation); making together 95,540 frs. For this sum there is obtained 59,225,424 carcel-hours' lighting, compared with 27,492,696 carcel-hours with electricity at an annual cost of 101,333 frs. This works out to 0·133 c. per carcel-hour for high-pressure gas (or 0·16 c. with interest and sinking-fund charges), and 0·368 c. for electricity. Consequently, for considerably less cost, Paris can obtain with high-pressure gas quite twice as much light as with electricity. In fact, for equal luminous intensity, lighting by electric arc lamps costs at least two-and-a-quarter times as much as incandescent lighting with compressed gas. As far as private consumers, who pay 20 c. per cubic metre for gas and 70 c. per kilowatt-hour for electricity, are concerned, the advantage is still greater; the cost per carcel-hour being in their case 0·14 c. and 0·42 c. respectively.

Presentations at the Barking Gas-Works.—Last Wednesday evening, two presentations took place in the offices at the Barking Gas-Works. The first was made to Mr. H. V. Mitchell, who has held the position of Assistant-Manager for the past four years. It consisted of a gold double-length albert chain, with a gold brooch, set with diamonds and emeralds, for Mrs. Mitchell. Mr. Mitchell has been appointed Engineer and Manager of the Brighton Gas-Works, Melbourne; and he sailed from Tilbury on Friday last. The other presentation was made to Mr. H. E. W. Wayman, clerk in the fittings department, who has secured a similar position with the Enfield Gas Company. In Mr. Wayman's case, the testimonial took the form of a fitted travelling bag. The presentations were made by the Secretary and Manager (Mr. W. B. Reidie) in the presence of about forty members of the staff and others; and the recipients made suitable acknowledgment.

COMPARISONS OF UPRIGHT AND INVERTED LOW-PRESSURE BURNERS.

By M. Grebel.

[A Paper read before the Société Technique du Gaz.]

Inverted incandescent may be said to be the prevailing fashion in gas lighting; and for some time past in a number of price-lists, translated from the German, it has been possible to find such daring statements as to inverted burners that it becomes necessary to set forth precisely the exact balance of advantage between burners of this type and those of the upright pattern. A certain latitude is perhaps permissible in extolling the virtues of commercial articles; but there are limits which, in decency, may not be exceeded. Certain of the exaggerations to which reference is made are so flagrant that they threaten to do harm to the cause of gas lighting.

To deal first with the inverted burner. M. Levy has pronounced an opinion upon it which is both just and moderate: "If it is not an improvement as regards the production of lighting power, it is at any rate an interesting novelty, in view of its applicability to specially decorative forms." Inverted burners have, in point of fact, been introduced in order to "imitate electricity;" and this is their greatest virtue in the eyes of the public. Personally, we are not much in love with this description of æstheticism which consists in producing new "creations" by copying the current models of older systems; in making an intensive gas-lamp similar in appearance to an electric arc; or in giving to an inverted incandescent burner the outward form of a Nernst lamp. In our judgment, each type of lighting possesses its characteristic beauty of form, which should be in conformity with its principle of correct action. But putting aside personal preferences, we recognize that inverted burners lend themselves to decorative effects resembling those of electric light. Designers have even embodied them in fittings of graceful form; but though skill is employed arranging the upward current of burnt gases, the mountings of inverted burners are rapidly oxidized and incrusted after being in use.

The problem of inverted low-pressure burners is one of considerable delicacy, as shown by the innumerable patents which have been taken out in connection with them. When working at a very low pressure in particular, the chief difficulty which is met with is in obtaining a speed of the gaseous mixture at the outlet sufficiently great to prevent the lighting-back of the flame into the burner—an accident which can readily happen owing to the heating to which the burner is subjected. In spite of the progress made in details of their construction, inverted burners show a great tendency to become deranged, and are extremely sensitive to any changes in pressure. Sooting of the mantle, in consequence of changes in the absorption of air, is fairly frequent. No inverted burner will work well at a pressure below 20 mm., and the majority are erratic in action below 30 mm. With all, the efficiency is greatly reduced with pressures rising from 40 mm.

Comparing the efficiency of the two types of burner, when both are used at the same low pressure, the efficiency of a good inverted burner properly adjusted and provided with a suitable new mantle is less than that of a good upright burner likewise properly adjusted and equipped with a suitable and new mantle. Although the gas and a part of the air recover (owing to the essential construction of the inverted burner) a little of the heat carried away by the burnt gases, the abnormal action of the burner (which opposes the force of the rising currents of gas and warm products of combustion) is sufficient to account for the inferiority at low pressures. It should be noted that both types of burner, by employing a draught, are improved by the pierced shade of Dr. Shott, and by glasses which are open below. There is a local intensification of combustion due to the rapid supply of extra air to the mantle surface, and thus to the flame.

In common with unquestioned authorities, we believe that we have done ample justice to the claim that "the only light which is of importance is that directed upwards from below" or "directed along a line at 45°," and of the other that "it is impossible to compare the practical performance of inverted and upright burners otherwise than by determining the mean lower hemispherical intensities of the two, and from this calculating the hourly consumption of gas per mean hemispherical carcel."

Those who extol arc lamps (using either continuous current or with inclined carbons), flat-flame gas-burners, or inverted mantles would have one admit that it is necessary to consider only the mean hemispherical intensity. As these types of apparatus naturally give no intensity, or almost none, above the horizontal, such a method would amount to converting this characteristic, which is inherent in these types, into an advantage in making photometric comparisons with those lamps which give a notable proportion of light on or above the horizontal. For these latter, it has been recognized that the standard of intensity along the horizontal, with which one has been satisfied for the early gas and oil burners, and with which one is still satisfied on account of its simplicity, should be replaced by that of mean spherical intensity. This latter should be adopted for the comparison of all systems of lighting, since by means of a combination of prisms or reflectors the light under all circumstances may be directed to any special points which it is desired to illuminate. As regards public lighting, it is possible, if absolutely necessary, to compare (though quite approximately) the lower hemispherical intensity of lamps or burners placed in their lanterns and fitted with their reflectors. The true comparison should be made between the useful flux of light or between the mean illumination obtained on the ground by the competing systems under the conditions specified above.

In order to make a fair comparison between the efficiencies of upright and inverted burners, we will take, in default of any complete tests of our own, the very careful experiments made by M. Ramassot, since he has determined, under comparable conditions, the spherical distribution of the light for both upright and inverted burners, calling for the consumption of the same quantity of gas, with an excess of pressure for the inverted burner of 5 mm., which can only be to its advantage.

It is evident that he has taken, not an old incandescent burner with injector of the three-aperture type and enlarged head, but a small Visseaux intensive burner, fitted with a pierced chimney and with a silk mantle which had been little used. Intensive bunsen burners of all types are characterized, as is well known, by an injector with one aperture only, progressive inlet of air, requiring as a rule several tuyeres, and a mixing-chamber of almost hyperbolic section. Their forms recall those of ejectors and other pieces of apparatus for ejection of fluids. At 50 mm. pressure the burner under examination gave 91 candles along the horizontal line for an hourly consumption of 90 litres—say, a little more than the candle-hour to the litre—*i.e.*, $\frac{90}{9{\cdot}1} = 9{\cdot}88$ litres per horizontal carcel-hour.

In fig. 1 will be found two diagrams. That on the left represents in polar co-ordinates the variations (with the inclination) of the luminous intensity of the upright burners obtained on a mean vertical semi-plane. By calculation, the mean spherical intensity is found to be 72·08 candles. From this it follows that: The consumption of gas per spherical carcel-hour is $\frac{90}{7{\cdot}208} = 12{\cdot}48$ litres.

M. Ramassot then took a good Farkas burner, perfectly adjusted, and fitted with an almost new mantle. This well-known burner consists of an inverted bunsen the mixing-chamber of which is pierced in a porcelain cone, which removes the products of combustion from the intake of direct air. Under a pressure of 55 mm., at an hourly consumption of 90 litres, it gives 70·2 candles along the horizontal. Obviously there is no reason for saying that it consumes $\frac{90}{7{\cdot}02} = 12{\cdot}82$ litres per carcel-hour; but it is interesting to find that this result is much better than the actual result, which is, as we shall see, 13·77 litres per spherical carcel-hour. As regards the consumption per lower hemispherical carcel-hour, it would be $\frac{90}{8{\cdot}812} = 10{\cdot}21$ litres. But no unprejudiced person, as we have already seen, is prepared to accept this criterion of the efficiency of inverted burners.

In fig. 2, on the left, is represented, in polar co-ordinates, the photometric semi-curve of the inverted burner. From a table of calculations, we find the mean spherical intensity to be 65·36

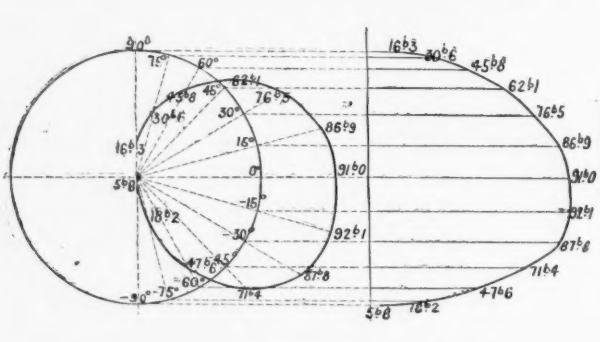


Fig. 1.—Upright Intensive Burner.

Pressure of Gas, 50 mm. Consumption per hour, 90 litres.

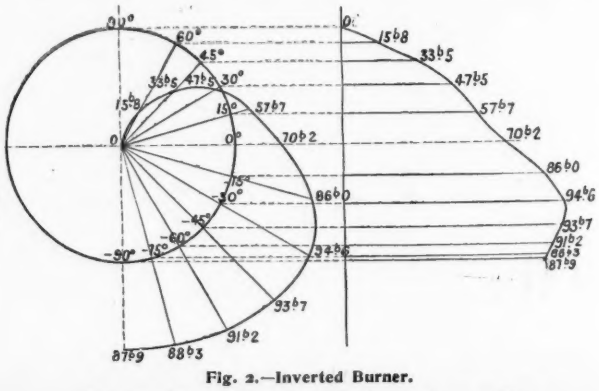


Fig. 2.—Inverted Burner.

Pressure of Gas, 55 mm. Consumption per hour, 90 litres.

candles. From this: The consumption of gas per spherical carcel-hour is $\frac{90}{6{\cdot}536} = 13{\cdot}77$ litres.

If, as is still too often done, we take horizontal intensity in the case of the upright burner and lower hemispherical mean intensity in the case of the inverted burner, the consumptions per horizontal and hemispherical carcel-hour would be 9·88 and 10·21 litres. But this comparison, which, moreover, is to the advantage of the upright burner, is without true signification. [According to tests by M. Th. Vautier, communicated to the congresses of 1904 and 1906, the difference would be a little more marked.]

In short, the good upright burner of 90 litres measured by M. Ramassot has consumed, under 50 mm. pressure, 12·48 litres per spherical carcel-hour, and the good inverted burner of the same consumption, under a pressure of 55 mm., 13·77 litres, or 10·34 more. This is a true and just comparison. It may be added that it will not do to repose confidence in the figures contained in certain literature translated from the German, in which care has been taken to refrain from converting Hefner into normal candles, and even from designating them by an "H." On the other hand, all practical men realize the great effect of the form, weight, nature, and age of the mantle, as well as the influence of adjustment of the burners on the photometric tests. The value of comparisons made by biassed and often none too scrupulous operators may therefore be questioned.

In the new inverted burners recently imported on the French market, the constructors appear to devote their attention to increasing the brightness of the mantle. In order to heighten the impression of brightness, they frequently provide their burners with serrated reflectors with smoked edges; the contrast-effect being very striking. From the technical standpoint, the essential feature of these burners is that the burnt gases do not escape freely, but serve to heat the combustible gas and the air supply. Other things being equal, on the speed of propagation of a flame being increased, the proportion of primary air should be reduced in order to avoid lighting-back. But by virtue of a small glass which almost surrounds the mantle, the latter receives a very active supply of secondary air, producing, as already said, the same favourable results as the sideway supply of secondary air to upright mantles by means of pierced chimneys.

We have shown in the "Genie Civil" that the brightness of a mantle may be almost doubled without the efficiency being enormously improved. The consumption of 12 litres per spherical carcel-hour may be considered as an absolute maximum with gas as at present made.

In the case of inverted burners, in which the whole of the light is thrown by reflectors below the horizontal, we gladly credit the promoters when they speak of 0·75 litre per candle-hour (but Hefner and lower hemispherical); for if these burners supply no intensity in the upper hemisphere, their consumption per spherical candle-hour rises to 1·5 litres, a rather high value.

Admitting that these burners emit 2/11ths of the total light above the horizontal, the consumption, reduced to normal spherical candles, rises to $\frac{0{\cdot}75 \times 9 \times 2}{11 \times 0{\cdot}9} = 13{\cdot}63$ litres, a figure which we are quite ready to admit. In making a comparison of upright and inverted mantles, account should be kept, not only of the gas consumption, but of small items, such as mantles and glasses. It would appear extremely difficult to estimate the cost and life of mantles for upright and inverted burners. These are approximately equal when a silk mantle is used for the upright burner. As regards steatite holders, which can be used again, they are of no greater value than pure nickel screws sold as old metal.

In next considering the volume of light produced by upright and inverted burners, it must be remembered that the illumination obtained with a given burner is less dependent upon its luminous intensity in a given direction than upon its total volume of light. However, apart from the power of the burner, it is necessary to consider the distribution of the volume of light. In this connection, there is likewise a specious argument put forward in favour of the inverted burner which calls for vigorous denial. As a result of their construction, spherical inverted mantles give their relative maximum of luminous intensity in a cone of an angle slightly greater than 90° (see fig. 2). The glasses or globes open only below, which are used to avoid the effect of air-currents and to assist the access of secondary air and the escape of burnt gases, accentuate this defect still more; and, if they are not absolutely transparent, they bring the maximum towards the vertical. Inventors and vendors of inverted burners seek to lay stress on the alleged fact that it is only the light directed downwards that is of advantage.

We will put on one side for a moment the question of outdoor illumination, and merely consider the lighting of rooms. As was clearly explained by the late M. Denayrouze, it is important to consider the diffusion of light by walls and ceilings in aiming at the absence of deep shadows. If diffusion is perfect, the space should be equally lighted in three directions—thus avoiding all shadow. For some time the extreme view has been taken that perfect lighting would be entirely by diffusion and concealed lamps. This unfortunately is a very costly method, since walls can reflect only from 20 to 60 per cent. of the light they receive, according as they are more or less matt and of colour more or less deep. We have all seen rooms completely painted in white or cream Ripolin, and containing either inverted arc lamps (enclosed in ornamental chambers) or else lamps concealed behind mouldings. Though the walls under these conditions reflect a large proportion of the light, the cost of the system is still very considerable. But, in the author's opinion, it involves further grave defects which should justify its almost complete abandonment. Although, with hidden lamps, objects may be seen very sharply, yet the eye misses the sensation of illumination. This latter should not be exaggerated; but it is quite as necessary to the eye as the sensation of lighting. Further, the lower part of a room lighted by the ceiling seems always too dark, and the upper part too bright. An alternative system which is often employed consists in allowing only a portion of the light to be reflected from the ceiling from arcs or incandescent burners by means of inverted transparent reflectors, which allow a part of the direct light to pass. These special methods demonstrate the importance of diffusion by the walls of the rooms which are illuminated.

As regards direct light, it should be distributed so that the lighting of the room appears uniform. This is exactly what the upright burners achieve, since those of their rays which are nearest to the horizontal, and therefore carry the farthest, are also the most powerful. [See fig. 3.] Where greater or less economy is aimed at, the upright burners are fitted with concave or conical, and more or less opaque, reflectors, which serve to direct towards the floor as large a proportion of the upward rays as are required.

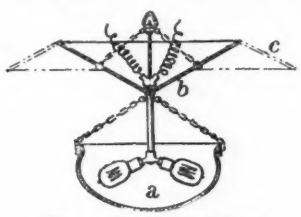


Fig. 3.—Gabreau's Diffuser.

Entirely opaque reflectors, however, are not to be advised for shops, for example, since they leave the upper part of rooms in comparative darkness. It is surely unnecessary to add that the charge made against upright burners, of giving shadow along the vertical, is quite incompatible with practical experience.

In opposition to the supporters of the inverted burner, the devices originated to correct the natural distribution of light from naked light sources all aim at spreading the volume of light and at raising the direction of the nearer rays from the vertical—*i.e.*, among others, the "Holophane" and the "Frédureau" globes. This idea of the most favourable distribution of light will be found in a quite recent invention of M. Gabreau. His diffusing apparatus for metallic filament lamps consists essentially of a chamber *a* of ground glass and of a cone *b*. Unless the apparatus is fixed immediately below a white ceiling, it also includes a supplementary reflector *c*. Evidently the chamber, like all ground, opal, or enamel globes, absorbs light. But this is the price we pay for diffusion.

I have thought it well to draw attention to this new system, because it appears to be the sign of an unconscious reaction against too powerful and brilliant sources of light employed without screens, and therefore highly fatiguing to the eye. Nevertheless, in order to obtain good lighting, the important point is to avoid multiplying the sources of light, to learn to judge the number which will be sufficient, and to arrange them so to as take advantage of the total power of light, but in a way which will not be distracting to the eye. It will be understood that, in the case of incandescent burners (which emit rays from mantles of fair size), the illuminating engineer avoids intense points of brilliant light; and he is greatly assisted in this connection by upright burners, which distribute their light advantageously. This feature need not, however, be over-estimated, since in interior lighting diffusion is a great corrective of bad distribution of the volume of light from lamps. In the case of multiple ceiling and reading lamps, the use of the inverted mantle would appear to be logical enough. Still, the upright burner, provided with a reflector, is capable of producing the same effect without dark shadows.

In cases where it is desired to dazzle customers with a blaze of light regardless of expense, it is true that recourse is more frequently had to electric light than to gas. Very often, at a given hour, the lighting in parts of certain restaurants is greater than 3 candles per cubic metre—that is, than 30 candles per square metre. On terraces of cafés, lamps of at least 500-candle power are separated by not more than 2 metres. In the windows of shops, light sources of 30-candle power are as close as 0·30 metre. In such cases, we should have no hesitation in using inverted gas-burners, since the light from each intermingles with the next, and the spherical distribution of the light, bad in single instances, is corrected by the multiple reflection.

We have now to consider outdoor lighting, where the whole effect is obtained by direct rays. In a paper read before the last congress,* as well as in the "Génie Civil" of Dec. 17, 1910, the author has dealt with a number of the questions bearing on this problem. It has been shown that the luminous intensity of outdoor burners should vary not only with the inclination, but also with the azimuth of the mean plane in question. In sectional lighting, where the lights from neighbouring sources combine, it would be logical to adopt as the ideal photometric curve that corresponding to uniformly decreasing illumination (3 in., fig. 4).

* See "JOURNAL," Vol. CXI., p. 117.

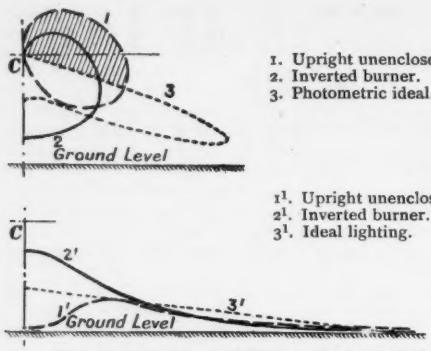


Fig. 4.—Comparison of Photometric and Lighting Curves.

This would permit of completely attaining the uniform horizontal lighting of streets or squares, ensuring *à fortiori* the proper lighting of crossings, pedestrians, and vehicles. The curve of illumination of the ground by the upright burner (1 in., fig. 4) approximates more nearly to our ideal (3 in., fig. 4) than that of the inverted burner (2 in., fig. 4), which leads us to the defect of regular spherical distribution with which the flat-flame burner is charged. If there is a lack of illumination at the foot of a standard carrying an upright burner, assumed to be naked, we obtain in the higher portions such excessive volume of light [see shaded portion in fig. 4] that it is most easy to bring it lower by means of a reflector such as is used in outdoor lighting, provided it is not one of the current widened type. The danger to avoid, on the contrary, is that this reflector may not sufficiently distribute the reflected light (in the direction of 3, fig. 4), failing to yield a bundle of sufficiently divergent rays.

A great organ of electric lighting has stated that light sources of which the chief radiation takes place at an angle of 45°, can be recommended for indoor lighting. Engineers assume without reason that this is also a criterion for outdoor lighting. Nevertheless, all obviously depends upon the height of the burner and the position assigned to it. Theoretical calculations as to the best lighting lead to heights which are inadmissible in practice. In a general way, however, there is some ground for increasing the heights of lamps beyond those usually adopted. The illumination

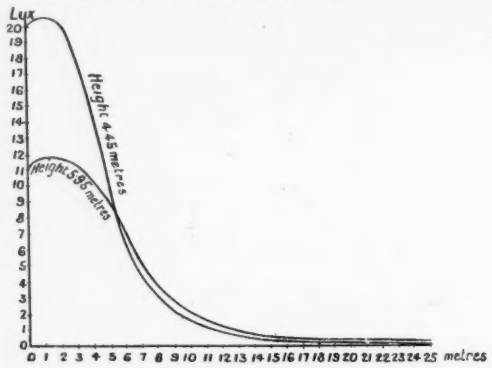


Fig. 5.—Lighting Curves with a 10-Ampere Arc Lamp with Opal Globe, at Different Heights.

obtained at the foot of the standard is then poorer; but, commencing at a certain distance away, it is better, and the whole is more uniform. [See the accompanying diagram of curves, given in "L'Eclairage à Paris," by M. Maréchal, in reference to an arc lamp.] Lastly, the light source, which is frequently very bright, is more outside the view at a short distance.

Particularly in the case of inverted mantles, it would be assumed that one could always reduce the abnormal excess of light immediately below the lamps by greatly increasing the height of the standard. Unfortunately, considerations of appearance and accessibility frequently make it necessary to employ short standards. In this case, in order to correct the defective distribution of light of the inverted burner, it is necessary to use, in addition to the ordinary upper reflector of the lamps, a second internal transparent reflector, which unfortunately collects quantities of dust on its reflecting surface. It is then necessary to make use of a third outside reflector on the lamp similar to that at *c* (fig. 3). The need of attaining regularly decreasing horizontal illumination is demonstrated in the creations of the Deutsche Gesellschaft für Bremerlicht and of the Siemens-Schuckert Company. Though the lighting power from above downwards is much reduced near the vertical, the flame arc lamp gives, around the foot of its standard, illumination of an exaggerated value relative to the mean and minimum values. With its dioptric cone (provided with a chimney arrangement), the Deutsche Gesellschaft für Bremerlicht succeeds in raising the whole of the photometric curve of the flame arc towards the horizontal—giving a general result analogous to that of our photometric curve of uniformly decreasing illumination. The Siemens-Schuckert Company pursues the same

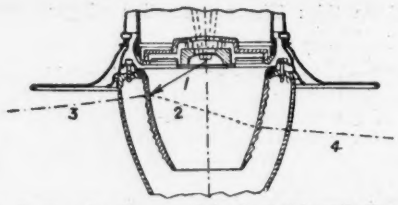
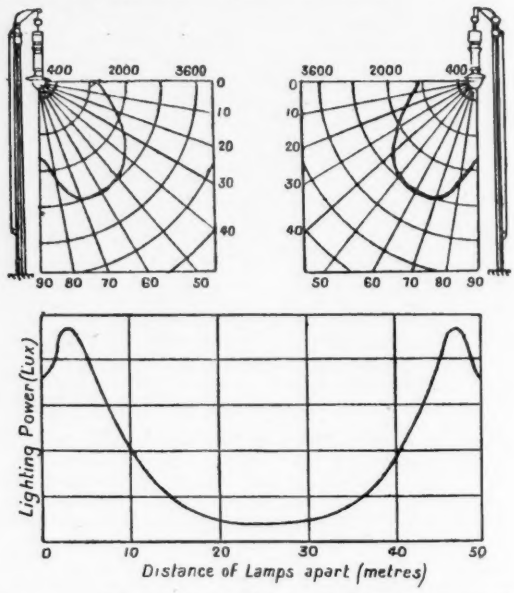
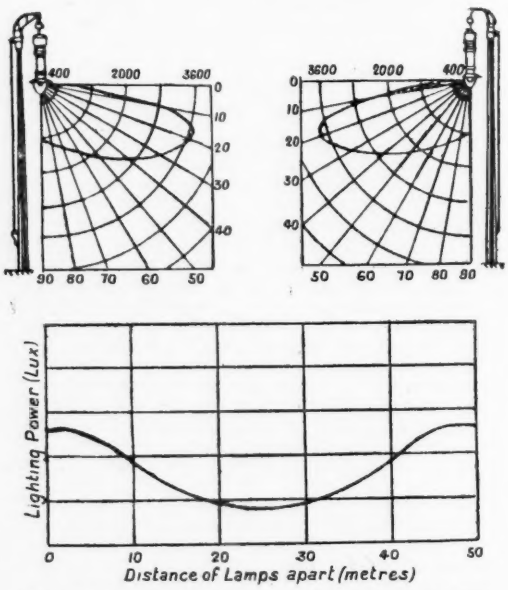


Fig. 6.—Section of a Siemens-Schuchert Prismatic Semi-Globe.

object in its prismatic semi-globe. As may be seen from fig. 6, the part of the luminous ray (1) which is directly refracted is brought along the line 3; and the part which is refracted at 2 is largely refracted along 4. As a result, the polar curves of lamps fitted with prismatic globes, instead of taking the form shown in fig. 7, are brought nearer the horizontal, as in fig. 8. The lighting on the ground produced by a pair of neighbouring lamps, which is very uneven when no globes are used (fig. 9), becomes approximately equal when globes are provided (fig. 10). It should be noted that the lighting is relative to the projection on the ground of the vertical plane between the two standards.



Figs. 7 to 9.—Photometric and Lighting Curves obtained with Two Flame Arc Lamps without Prismatic Semi-Globe.



Figs. 8 to 10.—Similar Curves obtained with Semi-Globe.

A limited success of these channelled globes, the efficiency of which is greatly affected by dust, indicates that they are of interest only in outdoor lighting by lamps placed fairly wide apart. The latter models of lamps derived from a competing industry show us once again that in both outdoor and indoor lighting, produced economically, the light sources should not be those which cast their maximum of light directly downwards or at an angle of 45°.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Meeting at Doncaster.

The One Hundred and Sixty-First Quarterly Meeting of the Institution, held at Doncaster on Saturday, was attended by just over a hundred members. In the early part of the day, the party assembled in the Guildhall, and, after partaking of light refreshments, proceeded in conveyances to the Bentley Colliery, one of the new pits in the Doncaster district, whose Manager (Mr. R. Clive) and his assistants showed the party round.

The Bentley Colliery is owned by Messrs. Barber, Walker, and Co., and is situated 2½ miles north of Doncaster. There are two shafts, 20 feet in diameter and 1875 feet in depth. Coal is being drawn from the Barnsley seam at the upcast shaft until the permanent arrangements are completed at the downcast shaft. The chief features of interest for the members were the ferro-concrete heapstead (on the Hennebique system) for the downcast or main winding shaft (in course of construction), and the permanent screening plant which is now approaching completion. The surface plant consists of four Lancashire boilers, working at a pressure of 160 lbs. per square inch. They are 30 feet long and 9 ft. 6 in. internal diameter. They are fitted with Green's economizers, with Dixon's downtake superheaters. There are two Weir boiler-feed pumps; and a Brunn-Lowner water-softening plant. The sets in the power house generate three-phase alternating electric current at a pressure of 550 volts. The current for lighting is transformed from 550 to 220 volts, single phase, for the surface, and to 50 volts for lighting the pit bottom. The plant consists of one Davey-Paxman set, 100 kilowatts "E C C" generator; two Bellis and Morcom sets, 250 kilowatts, with Westinghouse generator; and one low-pressure Rateau turbine, of 500 kilowatts, with Scott and Mountain generator. For the ventilation of the mine one new type Capell fan, single inlet, 16 feet in diameter, 5 ft. 6 in. in width, is used to produce 300,000 cubic feet per minute with 4-inch water gauge, driven by a Frazer and Chalmers engine, with cylinders 14 and 26 inches in diameter, and 3 feet stroke. There are two pairs of winding engines, Frazer and Chalmers' cross-compound make, with cylinders 35 and 58 inches in diameter, and 6 feet stroke, fitted with Corliss valves, cut-off gear, steam reversing gear, and Whitmore steam brake, and over-winding prevention gear. The drum is partly conical, with nine coils, rising from 12 ft. 8 in. to 13 ft. 2 in.; four coils ranging from 13 ft. 2 in. to 19 ft.; and the remaining coils on a parallel drum 19 feet in diameter. The winding ropes are 5½ inches in circumference, with locked coil. The present screening plant is capable of dealing with an output of 1000 tons in eight hours. There are two horizontal vibratory Marcus conveyors.

Returning to Doncaster, the members were received at the Mansion House by the Mayor of the borough (Councillor Wightman), and entertained at luncheon on the invitation of the Corporation. Alderman Armitage, the Chairman of the Gas Committee, presided, and was supported by the Mayor, several aldermen and councillors of the town, and Mr. Robert Watson, the Engineer and Manager of the gas undertaking, and this year's President of the Institution. At the conclusion of the repast, a short toast list was gone through.

Alderman Armitage, in proposing "The Manchester District Institution of Gas Engineers," said he and his colleagues were gratified to know that the members had thought fit to elect Mr. Watson as their President. He had known Mr. Watson for a long time, and had not the slightest doubt he would discharge the duties of the office with credit to the Institution and to himself.

Mr. Watson responded. On behalf of the Institution, which covered both Lancashire and Yorkshire and several towns in the adjacent counties, he thanked the Chairman of the Gas Committee and members of the Town Council very heartily for having invited the Institution to hold their May meeting at Doncaster, and for having entertained them. It was a matter of gratification to him personally to find himself so well supported that day by members of the Town Council; and for the benefit of those present who were not members of the Institution of which he had the honour to be President, he might say it was one of a number of organizations in the kingdom whose chief object was the advancement of the gas industry. They had at the moment, he added, several important matters in hand, the effect of which would be a more perfect system of carbonization, a more economical working of gas undertakings, and a more efficient use of the gas produced throughout the country. One of the schemes they had under consideration was that for the better education and training of the gas-fitter in modern gas practice. They also aimed at the education of the gas consumer as to the use of modern gas appliances, so as to get the best possible results from the illuminant supplied to them. The days of the flat-flame burner had practically gone; and with the extended use of the incandescent system, it was desirable the public should have as much information and assistance as possible in regard to modern appliances in gas lighting, so as to get the best results from every cubic foot of the gas consumed. He was glad to say the Manchester District Institution were in the forefront in such work.

Mr. S. Glover (St. Helens) proposed "The Corporation of Doncaster." He said they esteemed Mr. Watson for his worth and as a hardworking member of their Institution, and were delighted that the Corporation of Doncaster had afforded them the opportunity of seeing the works which he managed so well for the town. The members of the Institution appreciated very much the invitation given them by the Corporation to visit Doncaster and the entertainment offered.

The Mayor, acknowledging the toast, said the Corporation of Doncaster were always pleased to welcome and entertain those who were likely to help them to improve the town and its public undertakings. They were proud of their town, and proud also to welcome to it those likely to be of benefit to it. He had no hesitation in saying that there was no other town in the country, with the same population, that had so much acreage of its own as Doncaster; and they had in their own hands, not only the gas supply, but the water, electricity, and tramway undertakings, besides having their own markets. On behalf of the Corporation, he was pleased to welcome the gas engineers to the ancient town of Doncaster, and hoped they would have a pleasant and profitable visit.

Mr. J. W. Morrison (Sheffield) submitted "The Firm of Messrs. Barber, Walker, and Co.," and coupled with it the name of Mr. Clive, their Manager. In the course of his remarks, he said they had been fortunate that day in having an opportunity of visiting a colliery which, without doubt, was the most up-to-date in the country. As gas engineers, they had been particularly interested in the machinery for screening and freeing the coal from dross and rubbish, which gave them a good deal of trouble. They knew now that, with modern equipment, the coal could be freed of dross and rubbish. Their thanks were due to Messrs. Barber, Walker, and Co. for allowing them to look over their plant at the Bentley Colliery; and they were also deeply indebted to Mr. Clive for his courtesy in showing them round.

Mr. Clive, replying, said it had been a pleasure to him to show round the colliery such an interested party of visitors. As to a veiled suggestion made by the proposer of the toast that the application of modern methods to coal getting might result in cheaper fuel, Mr. Clive humorously observed that colliery owners were of the opinion that they ought to get more than was being paid at present for their coal.

Mr. H. Kendrick (Stretford), who gave the toast of "Kindred Associations," said he was pleased to observe that interest in the proceedings of the Manchester District Institution had been sufficient to induce members of kindred Associations to join them that day, and support by their presence the President, Mr. Watson. With the toast he associated the names of Mr. John Young (Hull), of the Eastern Counties Association, and Mr. W. J. Jenkins (Retford), of the Society of British Gas Industries. He had great pleasure in welcoming Mr. Young and several other members of the Eastern Counties Association. There were a good many things which the District Associations had in common. Several matters that the Manchester Institution had in hand at the present moment equally applied to other Associations; and the former desired the hearty co-operation of the other Associations in the work taken up during the last twelve months, so that it could be pushed forward to a really successful issue. The Society of British Gas Industries—a body representing, as it did, the manufacturers' side—they could not very well do without; and, as engineers, they were always pleased to come in contact with the members of that Society. The relationship between it and the Gas Associations was extremely cordial, and tended very greatly to ease the work which the gas engineers had in hand.

Mr. Young, responding, said the Manchester Institution had always been considered one of the best and most progressive of the district organizations. He could afford to say this, because he did not belong to it. These Associations, he added, were doing a great deal of useful work; and he referred in particular to the excellent results emanating from the Commercial Sections. Then as to the Junior Gas Associations, it was a satisfaction to them, as Seniors, to know that the rising generation of gas engineers would be better equipped for their work than they were. It was not only the reading of papers, and discussions on them, that made these District Associations so useful and beneficial to the industry. It was also because of the opportunities they afforded gas engineers of meeting for a friendly chat, of rubbing shoulders together, and visiting each others' works.

Mr. W. J. Jenkins, in the course of his response, said the Society he represented and the different Gas Associations were at present working in unity; and as the object of both was the supply to the public of better and cheaper gas, the best thing they could do to achieve this was to continue the policy.

Mr. E. Allen (Liverpool) proposed the health of the Chairman; and with Alderman Armitage's reply, the proceedings at the luncheon were concluded.

The Business Meeting.

The Mansion House had been placed at the disposal of the members for the business meeting. Mr. Robert Watson, the President, occupied the chair.

The Hon. Secretary (Mr. W. Whatmough, of Heywood) read a number of letters and telegrams received from members of

kindred Associations who were unable to be present at the meeting. There were also communications of the same character from several members of the Manchester Institution, including Mr. Thomas Newbigging, the Hon. Treasurer.

On the motion of Mr. CHARLES WOOD (Bradford), seconded by Mr. E. A. HARMAN (Huddersfield), a vote of thanks was accorded the Chairman and members of the Doncaster Gas Committee for the arrangements made for the meeting; and Alderman ARMITAGE briefly acknowledged the vote.

THE EDUCATION OF THE GAS-FITTER.

The following report on the scheme for the better education and training of gas-fitters was submitted by the Special Committee appointed to deal with the matter.

Scheme for Education and Certification of Gas-Fitters.

The Committee recommend that classes in gas fittings and appliances should be formed in connection with all technical schools, and where technical schools are not available that a limited number of small towns should be grouped together and classes promoted at a fixed centre (on a gas-works if no other place is available). That the syllabus as submitted be adopted, and arrangements made for its subdivision into two courses (ordinary and honours). That a practical class in gas-fittings, &c., be taken concurrently with the ordinary grade—the whole making up the full course of gas-fittings and supply. Gas-fitters to be required before receiving a certificate of competency to pass practical, oral, and written examinations in gas fittings and appliances. The City and Guilds of London Institute to be asked to include gas fittings and appliances in their syllabus as a separate course and to conduct the written part of the examination. The practical and oral portions to be conducted by examiners appointed by local committees, who would consist of accredited representatives of the gas undertakings and trades associations employing gas-fitters. The local committees shall comprise representatives from not more than twelve gas undertakings and trade associations within the same areas. The certificates to be issued by the authority of the district committee to working gas-fitters, and no gas-fitter after a date to be determined will be employed by a gas undertaking or allowed to fix apparatus for a gas undertaking unless he has obtained such certificates in the ordinary and honours examination.

The expenses of the local committees to be met by the gas undertakings and local trade organizations in fixed and definite proportions levied upon the undertakings and associations in each district.

This suggested scheme to be reconsidered by this Committee after the discussion at Doncaster and Glasgow, and then submitted to a full meeting of representatives of the District Associations and Trade Associations, after which it should be referred to the Institution of Gas Engineers and the various authorities approached and the work started.

(Signed, on behalf of the Committee)
ROBERT WATSON, President.

May 16, 1911.

The PRESIDENT thought it desirable, before any discussion took place on the report, that he should recite briefly the steps which had been taken in connection with this scheme from the start down to the present. As most of them would remember, Mr. Kendrick, in the course of his Presidential Address in February of last year, alluded to the difficulties which gas engineers experienced in the various districts in consequence of the inadequate knowledge and training of gas-fitters. It was felt that something ought to be done for the purpose of giving to the gas-fitter opportunities of acquiring a better knowledge of what was required in modern gas practice; and Mr. Kendrick suggested that classes should be established at the various technical schools for this purpose. Since then, the matter had been considered by a Committee, and arrangements made to give effect to the scheme. Classes had been fixed up at Salford and Manchester; and there had been communications with the various Plumbers' and Gas-Fitters' Associations, to see how far they would assist in the movement. It was reported, as the result of these negotiations, that the Ironmongers' Federated Association, and various Gas-Fitters' Associations in the country, were in favour of the scheme generally. But, unfortunately, the Plumbers' Institute were holding themselves aloof—that was to say, they were not favourable to the suggestions made to them in regard to the issue of certificates. Up to the present, however, they had secured the support of the Ironmongers' Federated Association, and the Birmingham Master Gas-Fitters' Association, and the promise of support from other Associations, in evolving some scheme for the establishment of classes to be held up and down the country for the purpose of giving local gas-fitters the opportunity of becoming better acquainted with the many requirements of modern gas practice. Classes had been arranged for, as he had said, in Manchester and Salford, and also at Southport, Birmingham, and Nottingham; and the support given so far was sufficient to justify the Committee of the Institution going forward with the scheme. Mr. Watson added that the matter was to be discussed at the Glasgow meeting of the Gas Institution, after which something definite could be done to give effect to the scheme; and he desired to say that the Committee had received valuable help and assistance from such gentlemen as Mr. Iddon (of the Ironmongers' Federated Association), Mr. George Helps (of Nuneaton), Mr. H. Lees (of Hexham), and Mr. J. H. Brearley (of Longwood). Mr. Phillips (of the Birmingham Gas-Fitters' Association) had also, he said, taken great interest in the matter.

Mr. KENDRICK, at the call of the President, gave some further particulars of the scheme. He said that the Ironmongers' Federated Association had for years past conducted a scheme for the education of their own apprentices in their Society, and had an examination for students in various branches of their trade. It had, however, been found quite impossible to rely implicitly upon written examinations; and this was borne out to a great extent by the experience which most others had obtained during the past twelve months in carrying on classes in gas-fitting appliances in connection with the technical schools. The papers which he had examined of students in his district and Salford, showed that a written examination was altogether unreliable as to the ability of the different classes of students brought before them. In conversations with the students at the classes and the lectures, it was possible to get from them correct answers, and to ascertain to a great extent the knowledge they had imbibed, not only from the lectures, but from other sources, with regard to the various matters which had been discussed and dealt with. Yet some of these students in a written examination would have absolutely failed. He attributed this in a great measure to the fact that boys who left school at 14 years of age, on taking up a subject at the technical school—say, at the age of 18, 19, or 20—had lost a great proportion of elementary knowledge. Consequently, it was considered advisable under the scheme to have a practical and oral examination. Turning to deal with the scheme in connection with the Rutherford College at Newcastle, he said that it went much beyond the ordinary technical school course, and was very much like a University course. It was suggested that there should be a three years' course for practical gas-fitters. The first year's course was to include mechanical drawing, gas-fitters' work, and workshop calculation; the second year, mechanical drawing, gas-fitters' work, elementary chemistry, and physics; and the third year, chemistry (specific), gas-fitters' work, gas supply ordinary, and workshop calculations. For the ordinary gasfitter this, in his (Mr. Kendrick's) opinion, was very much beyond what was necessary; but it might be all right for the man who was going in for being a distributing engineer. Therefore the Committee of the Manchester Institution were averse to such a course for the ordinary gas-fitter. The Commercial Sections, who had had the scheme before them, had asked the Committee to let the matter go before the Glasgow meeting; and as the subject was of more than local interest, affecting the whole of the Gas Associations throughout the country, there was no objection, because the more it was discussed the greater would be the benefit. He added that the scheme put before the members that day must not be regarded as being final—it was simply put forward as a basis for discussion. After the Committee had had the benefit of the help of members, and following upon the discussion at Glasgow, a scheme could be drawn up for submission to a meeting of representatives of the whole of the Gas Associations, and kindred Associations, for decision, before being placed with the Gas Institution in its final form.

Mr. H. TOWNSEND (Wakefield) drew attention to a paragraph in the report which set out that no gas-fitter, after a date to be fixed, would be employed by a gas undertaking, or allowed to fix apparatus for a gas undertaking, unless he had obtained a certificate in the ordinary or honours examination. It seemed to him that this clause was too drastic in its present form, and might wreck the whole scheme by making it too severe. There were old servants in the employ of gas undertakings who, though thoroughly efficient, could not pass an examination. Did he understand that such men would not be allowed to fix gas apparatus, because they did not possess a certificate?

Mr. KENDRICK answered the question by announcing that it was not the intention of the Committee to make the scheme retrospective.

Mr. J. H. BREARLEY (Longwood) said he felt that the present classes in "Gas Supply" did not meet all the requirements of the industry. They did go to a certain extent in this direction; but, as some of them had noticed, they had not pleased everybody, and certainly did not please many members of the Manchester Institution. They had undoubtedly done very good work in drawing attention to the necessity for a more scientific training of employees of gas undertakings. Those present would be interested to know that no fewer than 428 candidates had sat for examination in "Gas Supply" this year, and that he found from the papers the evident difficulty some men had in putting their experience into writing. This led him to say that he did not see how the practical examination under the scheme now before them was to be carried out. If it was feasible, he did not doubt that it would be a good thing. Still, he was somewhat pessimistic about the practical examination being a successful part of the scheme. Dealing particularly with the City and Guilds of London Institute syllabus, he said he thought there should be a gas-fitters' course; and then, if a man possessed intelligence above the average, and aspired higher, he could take the gas supply course. He was in cordial sympathy with the proposals of the Manchester Institution, and would be only too glad to do what he could to bring them to a successful issue.

Mr. E. ALLEN (Liverpool) proposed a resolution to the effect that the meeting approve of the scheme, generally, submitted by the Committee. He was strongly in favour of the movement for the better education and training of the gas-fitter.

Mr. GLOVER seconded.

Mr. KENDRICK, referring to the point mentioned by Mr. Brearley, said he did not anticipate that there would be any difficulty in carrying out the practical examination, though he was not in a position then to give any definite idea of the form it would take. Answering a question, he said they could not force their scheme upon the authorities and gas companies. It would be left to each

individual undertaking to adopt or not the course which was recommended by the Committee. All the Committee would do would be to recommend that such a course was desirable to meet present-day requirements, which were different from what was the case even a few years ago.

Mr. T. B. BALL (Rochdale) did not quite understand what was meant by the first two paragraphs in the report. In the first, it was proposed that classes in gas fittings and appliances should be formed; and, in the second, reference was made to a practical class in gas-fittings to be taken concurrently with the ordinary grade.

Mr. KENDRICK explained that there were really three courses, the syllabus of which was too long to be reproduced in the report; and he added that the scheme would be subject to alterations in the future. Nothing set out in the report was final. The Committee thought it desirable that there should be an honours class as well as an ordinary course for gas-fitters; and, with gas supply, this would make up the full course.

Mr. BALL thought that the introduction of the words theoretical and practical into the first paragraph of the report would have cleared the matter up.

The resolution was then put to the meeting, and carried unanimously.

THE MANCHESTER UNIVERSITY LECTURES.

In the absence of Mr. S. Meunier (Stockport), the report and balance-sheet in connection with the Manchester University Lectures was presented by Mr. Kendrick. It was as follows:

Manchester University Lectures, 1910 and 1911.

Your Committee report that the series of lectures given during the winter season of 1910 and 1911 were highly successful; the average attendance at the Saturday afternoon lectures being over 100 at each, including a considerable number of members of the Institution.

The lecturers are all well known in the gas and scientific world—viz., Professors Dixon and Harker, and Messrs. Dugald Clerk, Colman, Marshall, and Sheard; their subjects being all of the utmost interest to the gas industry.

The second series of Monday evening lectures were attended by 14 students; all the lecturers being Professors of the University—their subjects being gaseous combustion, &c., pyrometry, and analysis.

The interest of the great gas undertakings in the venture was aroused; and at three of the Saturday lectures, the chair was taken respectively by Alderman Gibson, of Manchester, Alderman Snape, of Salford, and Alderman Fernley, of Stockport—all chiefs of their respective gas undertakings.

The balance-sheet of the Saturday lectures is as follows:—

Receipts.	£	s.	d.	*Expenditure.*	£	s.	d.
University of Manchester	20	0	0	Advertisements and postages	1	15	0
Manchester District Institution	20	0	0	Fees to Lecturers	42	0	0
Manchester and District Junior Association	15	0	0	Do. Assistants and Porters	3	0	0
				Balance in hand	8	5	0
	£55	0	0		£55	0	0

The Committee are much indebted to the Vice-Chancellor (Dr. Hopkinson), Professor H. B. Dixon, and the Senate of the University, for arranging the lectures, and for their generous contribution to the funds of the Lecture Sub-Committee, as, without their hearty co-operation and approval, the lectures could not have been given. Your Committee trust that this is only the beginning of a lasting and fruitful connection between the gas industry and the Manchester University; and that every University in the kingdom will in the near future be the centre of similar activity.

Your Committee have, with the co-operation of the Junior Association and Professor Dixon, considered what should be done next session; and in view of the expressions of opinions by the members of the Manchester and District Junior Gas Association that a series of six lectures interfered too much with their ordinary meetings and visits, they decided to recommend either three or four lectures for next session. But as the course last session was too ambitious, and the time given to each lecture was too short for proper treatment, it would be advisable in the future to confine the lectures to a connected series, rather than a general survey, and that the basic principles underlying the operations in gas-works should be kept to the front, rather than the operations themselves.

With this end in view, it was decided to recommend a series of lectures on the theory and physical laws governing the distribution industrial and lighting applications of high-pressure gas, to be followed by lectures on radio-activity exhibited by the rare earths, &c., with special applications to incandescent gas lighting and gaseous heating. The suggested lecturers are all well known to science and the gas industry, and have been engaged in research work on the foregoing subjects.

The expenditure for these lectures is estimated at £35, less £8 in hand; leaving a total of £27 to find, which is proposed should be allocated as follows:—

University of Manchester	£10
Manchester District Institution	10
Manchester and District Junior Association	7
	£27

It is also suggested that two courses of six lectures each on special subjects bearing on the gas industry should be given by selected lecturers on week evenings in the Manchester University; and, if the Committees of the Senior and Junior Associations approve, that financial assistance for these lectures might be invited from the gas committees and companies in the immediate neighbourhood of Manchester.

Your Committee trust that you will approve of both these proposals, and that sanction will be given to them to contribute any sum up to £10 to the lecture funds.

The Committee would like to take this opportunity of acknowledging and thanking Messrs. Kendrick, Meunier, and Duxbury for their excellent service on the Lecture Sub-Committee; and they have requested these gentlemen to again act as their representatives.

(Signed) ROBERT WATSON, President.

On the motion of Mr. GLOVER, seconded by Mr. WOOD, the report and balance-sheet were adopted; the Committee being authorized to contribute £10 for the next course of lectures, if it be found necessary.

The PRESIDENT desired, on behalf the members, to acknowledge the services rendered in connection with this matter by the Sub-Committee, consisting of Messrs. Kendrick, Duxbury, and Meunier.

DEATH OF TWO MEMBERS.

The PRESIDENT regretted to have to record that, since the last meeting they had lost two members by death—Mr. Robert Midgley, of Skibbereen, and Mr. G. D. Martin, of Ormskirk. The Hon. Secretary, on behalf of the Committee and members, had forwarded letters of sympathy and condolence with the bereaved families.

The action of the Secretary of the Committee was endorsed by the members present upstanding.

IDEALS, OLD AND NEW.

Resumed Discussion on Mr. E. H. Hudson's Paper.

The next item on the *agenda* was the adjourned discussion on the paper read at the February meeting by Mr. E. H. Hudson, of Normanton, who had for his subject "Ideals, Old and New: Some Methods of Increasing Output" (see "JOURNAL" for Feb. 28, pp. 600-3).

The PRESIDENT, as a preliminary, asked Mr. Hudson if he had anything to add to his paper.

Mr. HUDSON answered in the negative, adding that he would waive any remarks he had to make until the discussion was ended on the points raised—namely, "general methods, maintenance of consumers' burners, free supply and fixing of cookers, fires, &c., as an alternative to preferential charges for gas used in domestic cooking and heating; differential rating; the relative advantages of high-pressure gas supply from central station and private installation; and testing of consumers' meters."

Mr. A. E. MOTTRAM (Ossett) considered that members would be glad if they had more papers on subjects similar to the one given by Mr. Hudson. How to increase the output of gas was a question which interested them all, whether by gas-cookers, gas-fires, slot installations, or other means. He was a believer in seeing that the public had the best possible value from the gas supplied. In his own case, he took particularly good care to keep everything in the very best possible order. As to slot-meters, his experience had been similar to that of Mr. Hudson; but he confessed he did not see why, as an alternative to the free supply of cookers, there should be a preferential charge for the gas used. He was strongly opposed to differential charges in this respect. In regard to high-pressure gas supply, he thought the best way was to have an installation in the centre of the town, especially if a small town, because everyone could see it. He had found it to be of very great advantage in his own case to have a high-pressure installation in the centre of the town to demonstrate that gas was undoubtedly the best illuminant.

Mr. J. H. BREARLEY (Longwood) entirely disagreed with differential rating unless it could be proved that the consumer having the concession was being supplied more economically than any other consumer. He failed to see how the user of a gas-fire was going to be supplied more economically than the consumer using gas for lighting. Then, as he had pointed out recently, these fires would only be in use during certain months in the year, which was bound to have an effect on their load at the works. It was also a fact that the consumer with a gas-cooker would use it more in the summer months than in the winter. On a test with separate meters, he found that gas-cookers consumed as a rule twice as much gas in the summer compared with the winter months. He advised his people to abandon differential prices; and he had had no reason to regret it—in fact, he had been congratulated for having done it. In regard to differential rating for gas-fires, he did not believe in saddling upon one class of consumers expense that should be borne by another class of consumers. He must say that he had not heard any solid argument in favour of supplying gas-fires at special rates; and his opinion was that if there were any benefits to be given, such benefits ought to go to the consumers who were their best customers.

Mr. H. KENDRICK (Stretford) said the prices charged should be equitably adjusted between the different classes of consumers, and in regard to the amount of gas used per annum. There was the consumer with a gas-engine who would be taking gas for 2000 to 3000 hours per annum; then the ordinary gas consumer who would consume gas for 1000 hours per annum; and, thirdly, there was the private house of the villa class, using gas for about 1500 hours per annum. Now, it seemed to him that there was a possibility of making a differential rate between these three classes of consumers. But why they should give differential rating for gas-cookers and gas-fires was beyond his comprehension. They would by this be asking Mrs. Jones, who did not want a cooker or fire, to pay an increased price for her gas, because Mrs. Brown next door did have a cooker or a fire. If people required these appliances, and intended using them, it should be in a manner

which would tend to the best advantage of the gas undertaking; and they should be willing to pay a small rental for their use. Those who wanted these rather costly appliances free were usually people who would only employ them occasionally, and as a matter of convenience. He had looked over the returns of a large number of undertakings with regard to the increase obtained where free cookers and other apparatus had been fixed; and he had found that the average consumption per cooker in a great many instances had fallen considerably since they threw overboard the hire for gas-cookers. In such circumstances, unless the department had a considerable surplus over and above what was required to pay the dividend, interest, &c., a charge should be made for the hire of the apparatus. He had gone into the matter with regard to his own Company. Those present would in all probabilty remember that some four or five years ago they at Stretford parted with a big slice of their territory—for a consideration, of course—and this very much increased their standing charges for a number of years. Notwithstanding all this, they, in the course of some eighteen months, increased their consumption to such an extent that the loss was more than made good. This was an achievement which his Directors were rather proud about; and he attributed it mainly to the introduction of free grillers, and still maintaining a small rental for gas-cookers. In this way, they had been saved a heavy expenditure in cookers, and obtained a very considerable profit from the grillers, of which, in 1909, they had supplied 4813, as against 1500 cookers. They had at Stretford a differential rating, based on the quantity consumed. They gave a slight concession to those who consumed over 50,000 cubic feet per quarter, and a little more to those burning over 500,000 cubic feet. Then they started again at 1d. less for gas for engines and manufacturing purposes. They began at 2s. 3d. per 1000 cubic feet for lighting, then 2s. 2d. and 2s. 2d.; and for industrial purposes, the prices were 2s. 2d., 1s. 11d., and 1s. 10d. per 1000 cubic feet. They had one consumer at 1s. 9d.; and he took 25,000,000 cubic feet per annum. By this classification, they had found that their profits had increased, and he was quite certain that if they had classified the consumers in any other way they would not have made the same profit.

Mr. J. H. Hill (York) was glad to find that Mr. Hudson had had such a satisfactory experience with his gas-fires; but he would like to know how it would be if they had a fine, mild winter. It was quite certain they could not get people to use gas-fires in a warm winter.

Mr. S. Glover (St. Helens) asked what Mr. Kendrick meant by gas for gas-engines and gas for manufacturing purposes.

Mr. Kendrick replied that in his district there were a considerable number of electrical undertakings that used gas for different melting purposes, and they were included under the head of "Manufacturing purposes."

Mr. E. A. Harman (Huddersfield) submitted, in the course of his contribution to the discussion, that the great question on the subject of differential rating was that of the standing charges. At Huddersfield, they charged 2s. per 1000 cubic feet for gas used for lighting and 1s. 6d. for gas-engines, less 5 per cent. Last year they sent out for lighting 236,308,300 cubic feet, compared with 230,183,600 cubic feet the preceding year; for stoves and power, at 1s. 6d., 295,583,200 cubic feet, against 269,447,300; and at 1s. 2d., for stoves and power, 11,787,800 cubic feet, as against 8,841,300 feet. Through prepayment meters, at 2s. 2d., they sold last year 250,105,100 cubic feet, against 217,797,700 cubic feet in the year ended March, 1910. The increase in the total gas sold in 1910 was 34,035,000 cubic feet, or 4·56 per cent.; and in 1911 it was 68,686,100, or 8·81 per cent.

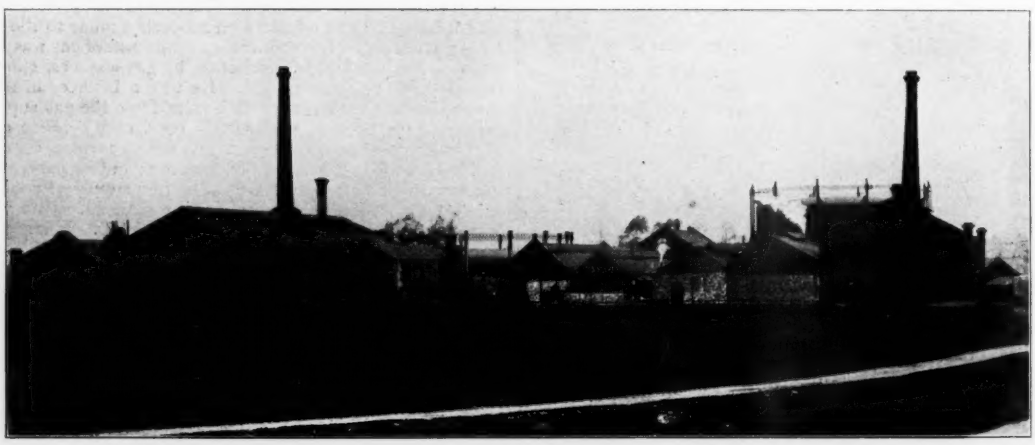
As the hour was now late, and no chance of further discussion, it was suggested by a member that it be continued at the next meeting, seeing that the question was such an important one.

The President pointed out that as they had two papers on engineering for the next meeting, making a very full programme, there would not be much chance for any further discussion of Mr. Hudson's paper.

A number of suggestions were made; and in the end it was decided that any member who desired to contribute to the discussion should commit his remarks to writing and send them to the Hon. Secretary, who would forward all such contributions to Mr. Hudson for his perusal. Then, at the next meeting, Mr. Hudson would reply on the whole discussion.

VISIT TO DONCASTER GAS-WORKS.

The members subsequently paid a visit to the gas-works of the Doncaster Corporation; and, under the direction of Mr. Watson and his assistants, made an inspection of the plant, returning to the Mansion House for tea provided by the Corporation.



A View of the Gas-Works.

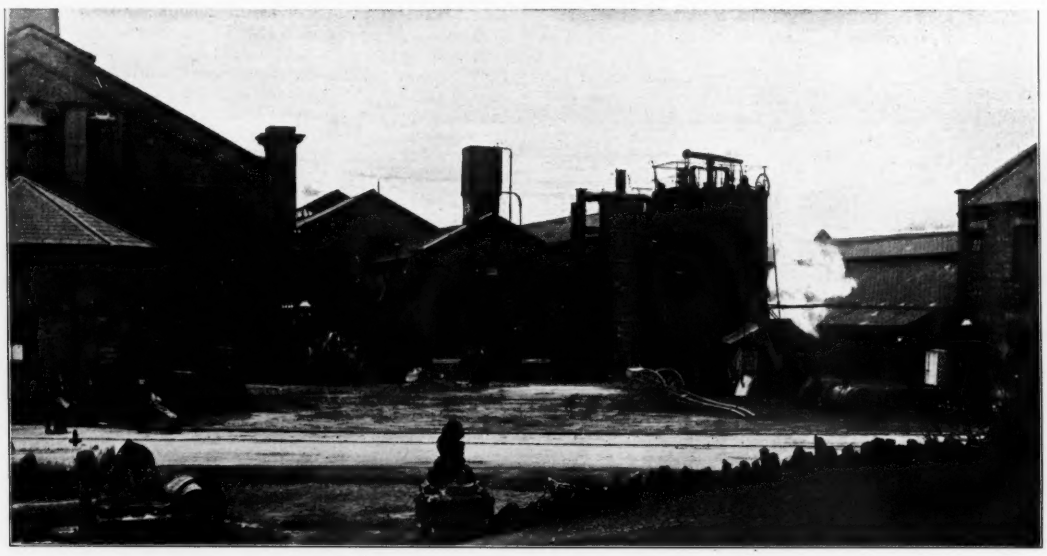
Doncaster Gas Undertaking.

From an interesting *brochure* prepared by Mr. Watson as a memento of the visit, it appears that public lighting in Doncaster was probably first introduced in the year 1764, when oil-lamps were adopted for street illumination. The first instance of the employment of coal gas occurred in 1814, when George Elliot, a whitesmith, in St. Sepulchre Gate, illuminated his shop by means of a plant on his own premises. Twelve years later, the question of a gas supply was under public consideration; and the Town Council were requested to take the matter up. A scheme was, in November, 1826, submitted for confirmation to the inhabitants of the borough. The enterprise was then finally undertaken by the Council jointly with a number of private subscribers, working under the name of the Doncaster Gaslight Company. The works were completed at a cost of £11,583; and the supply of gas was started in September, 1827. The price was 12s. 6d. per 1000 cubic feet—some consumers being charged by meter and others by time.

The Corporation held 333 out of a total of 784 shares of £10 each, at the same time advancing £2970 by way of loan. The management of the undertaking was virtually vested in the Council, who held the property in trust for all the subscribers to the Company. In 1858, the Corporation acquired the whole of the undertaking by purchasing the shares of the private holders. The capital account on the completion of the purchase stood at £16,150. The growth of the undertaking from 1858 was continuous and satisfactory. A stationary period occurred during 1901 and 1902, when electric lighting was introduced into the town; but the temporary cessation of growth was soon followed by further expansion of business.

Until the year 1904, the Corporation stood in the abnormal position of supplying gas to the borough and neighbouring townships without statutory powers, and were, therefore, a "law unto themselves" in gas matters. The growth of the town and district was such, however, that it became advisable to seek parliamentary sanction for any extensions which might be required; and the Corporation obtained the necessary powers. The gas undertaking, therefore, became authorized in 1904—starting its new and accredited career with a make of 195 million cubic feet, the low interest-bearing capital of £12,000, and practically unrestricted powers as to finance. The maximum price of gas was fixed at 3s. 6d.; a minimum power of 15 candles being prescribed. The low capital of the year 1904 was due to the yearly utilization from the start of the undertaking of some of the net profits to cover part of the capital expenditure incurred from time to time. This perhaps may be taken (Mr. Watson remarks) as an equivalent of sinking fund payments which were not otherwise provided for. The practice cannot be said to have unduly penalized the consumers; since as early as 1858 the price of gas equally in the borough and the outside districts was down to 3s. 9d.—to be successively reduced (with one break only) to 2s. 11d. in 1882, 2s. 6d. in 1893, 2s. 4d. in 1906, and 2s. 2d. in 1908. Discounts were all along given for quantity. Meter-rents were abolished in 1888.

The policy of the Corporation was evidently approved, since the Parliamentary Committee of 1904 expressed the opinion that "in the management of their gas-works and in the provision for the



The Gas-Works from the Entrance Gates.

capital expenses from year to year so largely out of revenue, the Corporation had taken a course which might very well be followed by many other corporations."

The borough fund has benefited yearly by various contributions from the gas profits. Following the Gas Committee's steps in modernizing the plant, and with increasing business, the annual amount so paid over has for the past four to five years been raised to £5000; and contemporaneously the consumers' interests have been served by reductions in the price of gas, equal (on the present output) to about £3400.

The advisability of obtaining statutory powers was speedily proved; for the years since 1904 have been characterized by considerable activity—due both to the ordinary growth of the town and suburbs and to the establishment of two or three large collieries, with consequent building operations, within the sphere of Doncaster's influence. An indication of growth is afforded by the fact that during the past twelve months some 6¾ miles of main have been laid, and 825 services connected to houses and lamps. The additional custom is at present mainly through prepayment meters, the return on which is obviously small compared with that from ordinary meters. It is, of course, difficult to say to what extent Doncaster will continue to grow; but several years will evidently elapse before the Gas Department will be able to settle down to merely normal and routine work.

The 1904 Act defined the gas area as covering the borough and ten out districts, and authority is given to supply gas in bulk to local authorities and others outside even these districts by arrangement. The growth of the undertaking is indicated by the following figures of gas made for the years ending March 31:

1858	28,000,000	cubic feet.
1878	60,013,000	,, ,,
1888	95,111,000	,, ,,
1898	155,631,000	,, ,,
1908	219,795,000	,, ,,
1909	230,691,000	,, ,,
1910	243,649,000	,, ,,
1911	259,647,000	,, ,,
Total capital, March 31, 1911	= £105,930	
Loans remaining unpaid	= £32,500	

The present price of gas is 2s. 2d. per 1000 cubic feet; and for gas-engine purposes, 1s. 11d. Discounts are given of 5 per cent. on accounts of £50 to £75 per annum, and 10 per cent. on accounts of £75 and upwards. Gas through slot meters is charged at 34 cubic feet per penny. No meter-rents are charged.

So far as present conditions of supply are concerned, the Corporation lay the service-pipe from the main to 3 feet inside the consumer's boundary wall, and fix the meter, with connections and main-tap, free; supplying a boiling-ring where desired. Cookers, with piping up to 40 feet, are also fixed free. These become the property of the consumers when the rentals amount in the aggregate to the list-price of the cookers. Moderate rentals are charged for hire.

Description of the Works.

The works occupy some 6 acres of ground, and are situated on the north side of the town, adjoining the Sheffield and South Yorkshire Navigation Company's canal. The latter affords at present the only direct means of communication with the coalfields; carting having to be resorted to in the case of coal or goods coming from the railway. Coal is delivered by barge and unloaded at No. 1 retort-house by means of a crane and half-ton corves hoisted on to gantries running into the building. In the case of No. 2 retort-house, a coal elevating and conveying plant is in use—as described by the President in his Inaugural Address last February. An automatic weighing and registering machine is employed with the principal coal-conveyor.

No. 1 retort-house, measuring 120 ft. by 60 ft., contains twelve beds of through retorts (chiefly 17 in. by 13 in.) still heated on the direct-fired principle. This plant is used for auxiliary work only; gas-making operations, from motives of economy, being concentrated in the fully-equipped No. 2 retort-house. The house remains to be modernized at a later date; the nature of its plant depending upon future local requirements, and the general development of gas-making processes.

No. 2 retort-house—originally built 90 feet in length by 70 feet wide, with parallel coal-stores 13 feet wide, and fitted with four generator beds of seven hand-charged through retorts—has been during recent years extended to take twelve beds in all, equipped with stoking and coke handling machinery. The building now measures 174 feet long by 70 feet wide, and possesses two coal-stores, respectively 174 ft. by 50 ft. and 86 ft. by 30 ft. Alterations

Loading and Unloading Canal Barges.

are at present in progress for the purpose of increasing the productive capacity of the house. The original four beds of seven retorts, built in 1893, were working badly; and these are being reconstructed and fitted for eight retorts, and a new bed added. The installation will consist of two benches, making in all thirteen beds of eight through retorts, 22 inches by 16 inches, with retort-house governors (8-inch size) and tar-columns for both benches.

De Brouwer stoking machines have been recently introduced; but the previously used West manual charger and drawing rake are retained for stand-by purposes. The generating set consists of a 33½ B.H.P. gas-engine with 23 K.W. dynamo working at 220 volts when running at 230 revolutions per minute. This plant provides sufficient power to serve both the stoking plant and the coke-conveyor. The latter is provided with a 13 B.H.P. motor as an alternative to the steam-engine usually employed.

Eight-hour charges have been worked during the spring; but these have for the time being been superseded by twelve-hour work. The coke is removed by means of a West conveyor; the house section being 173 feet long, and the outside and inclined portion at a 30° angle some 89 feet in length. The conveyor feeds to the yard

rotary screen and coke hoppers. Particulars of this plant were given in the paper read by Mr. Watson before the Institution of Gas Engineers in 1909.

The condensers are in two sections; the first consisting of two annular tubes (30 ft. by 3 ft. 6 in. by 2 ft. 9 in.) with 15-inch connections on the south side of No. 2 retort-house; and the other of three similar tubes at the east end of the No. 1 house—the gas passing through both sets. The boiler plant consists of two Lancashire boilers, each 30 ft. by 8 ft., fitted with Meldrum's forced-draught apparatus. There are three exhausters, one (Bryan-Donkin's make) with a coupled-up steam-engine, of 60,000 cubic feet capacity, and the others (Waller's pattern, and driven from overhead countershaft) of 60,000 and 40,000 cubic feet respectively.

The scrubbing plant consists of two cylindrical tower scrubbers (24 ft. by 6 ft.) of many years' standing, with a filling of wood-grids and drain-tiles, and fed with ammoniacal liquor. Following these is a C. & W. Walker combined tar-extractor and washer-scrubber equal to 1½ millions per diem. The top chamber of the scrubber is employed for naphthalene removal by means of "Solvene;" but "the necessity of such usage has not been apparent during the past twelve or eighteen months." The Phœnix rotary washer-scrubber is too small for present requirements, and has been virtually displaced by the purifying machine. There are four purifiers (25 ft. by 25 ft. by 5 ft.), with ordinary water-lutes (15-inch connections). Oxide of iron is used for purification; there being two layers per box. The revivifying floor is at the same level as the boxes, which are emptied and filled by barrows in the ordinary way. There is a set of purifiers (17 ft. by 10 ft. by 5 ft.), with shallow water-lutes and too small for ordinary work, which is used for check purposes.

The meter-house contains a 60,000 cubic feet station-meter with 18-inch connections; and alongside the latter is the town governor, both made by Messrs. J. & J. Braddock. The governor is water-loaded.

There are two holders (both with brick tanks) having a total storage capacity of a million cubic feet. No. 1 holder is single-lift (150 ft. by 26 ft.), of a capacity of 450,000 cubic feet and possessing considerable potentialities in the way of lift additions. The second is a three-lift holder (114 ft. by 20 ft.) to contain 550,000 cubic feet. The maximum output for any one day has been 1,171,000 cubic feet. An 8-inch safety governor is fixed in the holder valve-house, to afford a connecting bye-pass between the inlets and outlets of both holders.

The sulphate of ammonia plant consists of a C. & W. Walker still, with mechanical liming apparatus, capable of dealing with 20 to 23 tons of ammoniacal liquor per diem. The saturator (4 ft. 5 in. by 3 ft. 4 in. by 2 ft. 11 in.) was made by Messrs. Joseph Taylor and Co.

The tar and liquor wells are three in number—one measuring 70 ft. by 25 ft. by 11 ft., and the other two (disused gasholder tanks) each 41 ft. diameter by 16 ft. deep.

The fitting shops contain, among other plant, an 8-inch centre lathe, with 10-feet bed, a punching and shearing machine to punch ⅝-inch holes and shear ⅝-inch plate, hand and power screwing machine, and 36-inch pillar drilling machine, &c.

Distribution.

The total length of mains in the district is now 49¼ miles. The original trunk main from the works was 15 inches; but in 1902 an additional 24-inch trunk main was laid, and carried untapped to the junction of High Street and Baxter Gate some 940 yards distant. It is from this point that distribution virtually takes place. This method was followed in a subsequent 18-inch main extension through Silver and Cleveland Streets (about 1080 yards); no gas being taken off it until near the end of the main. The whole of the area supplied is comparatively flat, and there is little need of either district or consumers' governors.

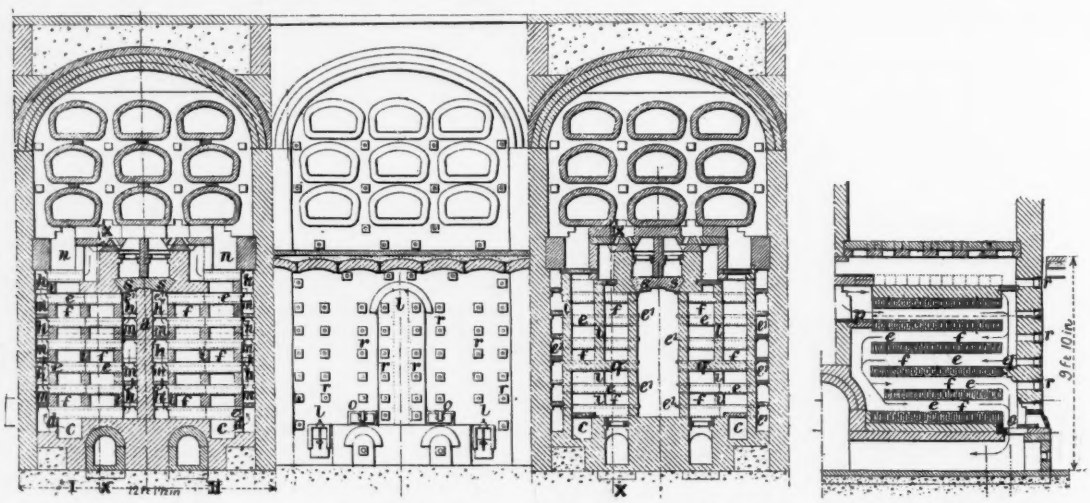
There are 4681 ordinary meters in use and 5936 prepayment meters. The total number of cookers on hire is 2419. This figure does not represent the cookers actually in use, since a number are now the property of the consumers, having been written off on payment of the full rentals. The public lamps (varying in sizes) number 1045.

TWO TYPES OF REGENERATIVE FURNACES.

Two papers were read at the Marseilles Congress of the Société Technique du Gaz last week [a report of the proceedings at which appears in the present issue], dealing with the construction of regenerative settings of retorts. The object of one of these papers—that by M. Defoy—was to show a method of constructing the regenerative part of a setting so that it might be wholly and more easily inspected and cleaned—"*visitable*," to use the French word, for which there is hardly an exact English equivalent. The nature of the arrangement adopted will be seen from the illustrations of it given and from the translation of the text of the paper. The point of the second contribution to the subject was to indicate a method whereby in small gas-works, direct-fired retort-furnaces could be easily and economically converted into regenerative settings without any subway in front of the bench. This will also be clearly seen from the figures taken from M. Ch. M. Stein's paper. We give first the account of

M. DEFOY'S FURNACE.

The air of a retort-house is vitiated by very fine dust arising from the different operations taking place, and the mechanical conveying of coal and coke. The quantity of dust in the air varies with such operations (the charging and drawing, cleaning ascension-pipes, filling and clinkering the producers); but there is always a quite appreciable amount in the retort-house and its neighbourhood. Now the air required for heating the retorts is necessarily borrowed from this vitiated atmosphere. In most gas-works, the combustion is effected in two stages. One part of the air passes under the fire-bars, and, in passing through the bed of coke, contributes to the formation of the gas for combustion. The dust carried by this primary air becomes ash, and mixes with the clinker, or else continues along the air passages towards the combustion chamber with the combustible gas. As for the secondary air, it arrives at the same end by a different route through the regenerator; and the dust carried along with it, turned into coke and ash, is partly deposited along its course, usually in cold spots where the rate of circulation is lower, and in places where the form of construction causes eddies. The volume of secondary air passing through a regenerator reaches during a season a considerable figure, when it is remembered that about 650 cubic metres of it are required to carbonize a ton of coal. Admitting that each cubic metre of this air allows an infinitesimal amount of ash to pass into the regenerator, it may very well be that eventually it causes, at certain points in its passage, unusual resistance, which consequently interferes with the equal distribution of the air in the pots of the regenerator, and therefore in the regenerator itself. It appears to be useful, therefore, when a bed is let down, to be able to clean out completely the dust in these air-pots as well as in the gas passages. With this object, the form of regenerative furnace shown in figs. 1 and 2 has been designed.



Sectional Elevation. Front Elevation. Sectional Elevation without Front Wall, so as to Show Regenerator.

Fig. 1.

Side View of Regenerator on line XX.

Fig. 2.

Defoy's Arrangement of Retort-Furnace.

The circulation of the gas and air takes place horizontally in the two symmetrical parts, I. and II., of the regenerator, which are separated from top to bottom by a wall (*a*). In each part, the air passes through the pots (*e*), placed alongside and on top of each other in horizontal layers. The waste-gas flues (*f*) separate the layers of pots, which form the top and bottom of the flues, the sides of which are made of refractory pieces (*i*). The number of the flues and pots varies in proportion to the capacity of the regenerator, which depends on the size of the retort-bed. The outside pots in each layer have small brackets (e_1). The secondary air circulates from the bottom to the top. It enters by an adjustable register (*l*) in a chamber (*c*) and passes through a fire-clay grill (*d*) and begins its course in the bottom layer of pots, then enters the layer above, and so on zig-zag, until it reaches the nostril holes. The chambers (*m*), communicating from one layer of pots to the next, are separated by fire-clay plates (*j*), supported on one side by the pot brackets (e_1) and on the other by brickwork projections on the dividing wall (*a*). Brick grills (*h*) equalize the distribution of the air at its entrance to each layer of pots. The spent gas is caught in the horizontal chamber (*n*) and descends zigzag through the flues (*f*) to the adjustable register (*o*), and thence to the chimney flue. Division walls (*p* and *q*) decide the course to be taken, which is such that at no point can currents meet in different directions.

The regenerator thus built consists of waste-gas flues (*f*) and air communicating chambers (*m*) which are easy to control, to clean, and to repair by the plugs (*r*), distributed over the front wall; and no obstruction is caused by the retort-house flooring. The slight depth of the regenerator also allows the subway to be made with little width when the producer is underground. The chief characteristic of this system of regenerator is in the possibility of having an inspection chamber in the centre of the setting, accessible for a man, by means of the opening up of a door (*t*) in the centre of the façade and of the wall (*a*).

Thus, on the letting-down of a bed, and for very little expense, the cleaning-out can be effected of the dust deposited by the circulating air, and which dust may not have been got at through the plugs of the chambers (*m*); the inside of the pots can be repaired, if necessary; and a complete grout-washing can be done, both to the waste-gas flues and the air flues. Further, the arrangement has the advantage of enabling the exact value of the regenerator to be arrived at, and of avoiding putting it out of service without knowing the cause. After the inspection, the wall (*a*) is rebuilt, the arch opening (*t*) is filled in, and the bed put into work.

In conclusion, the compactness of this regenerator may be noted, which protects it from dislocations due to the expansion of the mass of brickwork; also its distance from the producer in order to avoid any direct transmission of calories from it to the secondary air, leading ultimately to a loss of fuel. The regenerator described is totally different from those now in use. It can be adapted to all the types of retort-beds employed for the manufacture of gas, and generally to all regenerative furnaces.

M. STEIN'S REGENERATIVE FURNACE WITHOUT SUBWAY.

The author of the second paper says that the increasing difficulty of getting stokers and the necessity of economical working explain the growing tendency for even small gas-works to put in producer settings. To meet this, a special type of bed has been designed, more particularly for the transforming of an ordinary grate-bar furnace into one with producer and regenerator.

As seen in fig. 4, the producer is of the old vertical type without fire-bars, the raised arch of which enables the gas to pass out directly into the small combustion chambers (*b* of fig. 3) formed by the spaces between the two tiers of retorts. Thus a practical height for gasification of at least 1·30 m. (about 4 ft. 3 in.) has been obtained, and this with an opening of only 1 m. (3 ft. $3\frac{3}{8}$ in.) in depth in front of the bench. The regenerators R (figs. 3 and 5) are placed on each side of the producer G, and are composed of pots with vertical holes. All the joints, without exception, are let in, which avoids any short-circuiting between the air and the waste gases. The producer is fitted from a door replacing the old door of the direct-fired furnace, and it is charged with a shovel in the ordinary way. To allow of clinkering and the easy pricking of the producer, the opening F is covered with a hinged floor-plate P in three parts, so as to leave the top of the opening quite free. The sides of this opening are covered by cast-iron plates, which can be lifted out when the regenerator is being cleaned (say) twice a year.

The working and the regulating of the bed are very simple. The producer is not provided with a door (other than the feeding-door); and a simple sheet-iron screen is placed in front of the furnace, so as to avoid too great a radiation into the opening. The secondary-air valves are padlocked when once regulated; and the special registers placed at the outlet of the waste gases from the regenerator are also adjusted once for all in a position corresponding to the maximum capacity of the setting. In short, the bed being regulated for carbonizing in 4 hrs. 48 min., corresponding to a given draught in the flue C, as shown on an indicator, the draught is kept constant by means of the general register in the flue, which ensures a regular temperature. It is very easy to find out what draught is required for carbonizing in six or even eight hours; and the working of a single register allows of the necessary variations being made. A very important feature of this type of bed is the regularity of the temperature inside the main arch, and the absence of any direct flame on the retorts.

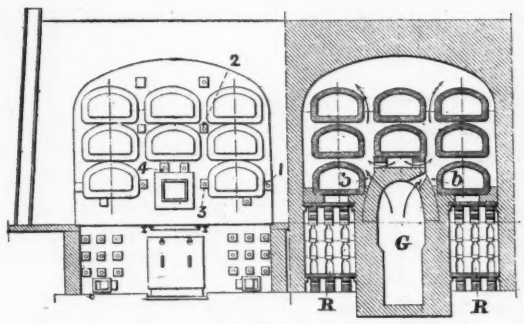


Fig. 3.

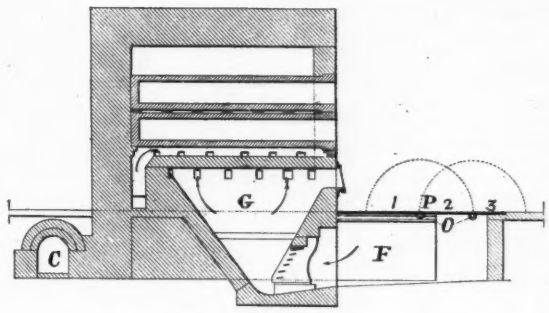


Fig. 4.

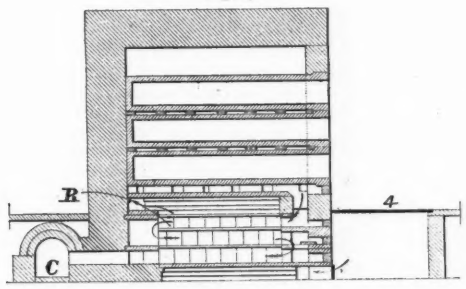


Fig. 5.

Stein's Regenerative Furnace without Subway.

[Arrows with one head show the primary and secondary air flues; with two heads, the gas flues; with three heads, the waste-gas flues.]

The following are the temperatures taken by the Féry pyrometer at the Orleans and the Creil Gas-Works:—

	Orleans Gas-Works.		Creil Gas-Works.
Plug No. 1 . . .	1085° C.	..	1060° C.
,, 2 . . .	1300°	..	1260°
,, 3 . . .	1120°	..	1100°

The temperature at the nostrils is slightly lower than that between the top retorts, which is satisfactory for good working conditions. The temperature of the secondary air taken in the passage under the middle retort at plug No. 4 was 950° C. at Orleans and 920° C. at Creil. The temperature of the waste gases is constantly between 500° C. and 550° C.; that of the gas leaving the producer at the nostril holes, taken by the Le Chatelier thermo-electric pyrometer, was about 825° C., which enables the heating value of this gas to be well utilized, and allows of having a gas rich in carbonic oxide and weak in carbonic acid and hydrogen. This has been verified by analyses of the gas, which gave the following percentage results: CO, 28·5; O, 0; CO_2, 2; H, 8; N (by difference), 62. The analyses of the waste gases showed constantly CO_2, 17 per cent.; O, 1 per cent.; CO, 0 per cent.

As regards the quantity of gas made and the consumption of fuel, official figures of a year's working at the Creil Gas-Works on beds of eight retorts are:

Gas made per 100 kilos of coal	30·78 cubic metres.
Coke used ,, ,, ,, ...	14·34 kilos.

This was with a charge per retort of 160 kilos. (over 3 cwt.), and with five charges per 24 hours. These results are those under ordinary working conditions; the producer being filled every three hours, which, however, might easily be extended to four hours. The cinders from the coke consumed amounted to 16 to 17 per cent. of the weight recovered. The charges of coal were composed of four parts of Lens to one part of Bruay.

The results at Creil have been corroborated by those at the Orleans Gas-Works on six beds each of seven retorts. A 48-hour test on these showed: Coal carbonized, 70·7 (metric) tons; or an average of 168·3 kilos. per retort in 4 hrs. 48 min. Coke consumed, 10·846 (metric) tons, or 15·33 kilos. per 100 kilos. of coal carbonized. The charges were composed of one-half Bruay and one-half Courrières.

It is to be noted that these beds work freely and constantly under pressure in the main arch; the pressure being from $\frac{1}{2}$ mm. to 1 mm. of water at No. 2 plug. They work under exactly the same conditions as the big settings with subways.

TAR CONDENSATION IN PARIS GAS-WORKS.

By M. Henri Laurain,

Chief of the Technical Department of the Paris Gas Company.

[A Paper submitted to the Société Technique du Gaz.]

Of late years, the question of the condensation of tar in gas-works has led to keen discussions of great interest in all countries. Without taking any direct part therein, the Paris Gas Company have followed with the greatest attention, and in the smallest details, all the works which have been produced on this question. Moreover, the Company have carried out some very important investigations at their experimental works at La Villette. The author therefore considered it would be interesting to his French colleagues to be made acquainted with the results.

The programme of work at the experimental station was arranged by M. Sainte-Claire Deville, who followed its execution with the greatest care, and drew therefrom conclusions which are interesting to a high degree, and which form the subject of the present paper. The experiments in question do the greatest honour to the Chief Engineer at the experimental works.

Explanation of the Principle.

The considerations which served as a basis for the studies made may be summarized as follows:

1.—Condensation in gas-works should be organized with a view to minimizing the percentage of naphthalene in the gas. The small quantity of illuminating hydrocarbons which the gas can lose owing to the endeavours made to retain the naphthalene in the tar is practically negligible.

2.—The natural absorbing agent of naphthalene is the vesicular tar in suspension in the gas at the outlet of the hydraulic main. It only acts effectively in the cold. Moreover, it is strictly sufficient in quantity; and things should be so arranged that no particle of this precious solvent will be separated from the gas before being put into equilibrium with it at the lowest temperature.

3.—The gas must consequently be rapidly and completely cooled as soon as it leaves the hydraulic main; the extremely intimate mixture of the gas and the washing liquor, suspended in fine drops throughout the entire mass, being turned to account. Thanks to this blending, the moment cooling is at an end, one may be sure the equilibrium of tension between the fumes dissolved in the tar and those diffused in the gas is established for the lower limit of temperature, which is that of the water of refrigeration.

4.—If, however, at this instant, the tar has absorbed all the naphthalene it can dissolve, it is far from being separated from the gas. Were it conveyed in this state into the mains on the works, there would be a risk of its becoming heated there, at least in some places; and the effect of this heating would be to diffuse again in the gas a portion of the naphthalene previously dissolved by the tarry bubbles still in suspension. This is why it is useful to hurry the deposit of the vesicular tar by installing an impact condenser as near as possible to each cooler or in the lower portion of the machine. If, for special reasons, the impact condenser cannot be placed under the cooler or in its immediate vicinity, the pipes conveying the gas from the refrigerator to the Pelouze and Audouin condenser should be so arranged that they will not be affected by heating.

5.—In such circumstances, the gas, in finally separating from the tar, is in equilibrium of tension at the lowest temperature with the naphthalene solution—sufficiently abundant not to be saturated—in the tar. It gives off fumes with a much less degree of tension than the maximum tension of pure naphthalene at the same temperature.

6.—The reason for naphthalene being a cause of so much inconvenience in most gas-works is the fact that there is a system of mains, called "collectors," in which the gas is hardly cooled, running from the retorts to the condensers. All or a portion of the vesicular tar is deposited in these mains; and, flowing still hot into the syphons, does not fulfil its function of a cold solvent for naphthalene vapours. Therefore, when these begin to condense copiously in cold places, in presence of the small quantity of bubbles remaining, there is produced, instead of extensive dissolving of the naphthalene in the tar, a mixing of concentrated solution and pure naphthalene—in other words, a supersaturated solution which gives off naphthalene fumes with a tension equal to the maximum tension of pure naphthalene fumes.

7.—In works for the carbonization of coal with recovery of bye-products, it would be possible, by systematically increasing the dimensions of the collectors, to allow all the tarry bubbles to deposit hot. The gas, very rich in naphthalene fumes, and kept hot (artificially if necessary), would then reach the apparatus where treatment with heavy oil in excess would free it from both benzol and naphthalene. This system is scientific and realizable in coke-works, but would be quite out of place in gas-works.

Plant.

Refrigerator.—A single tabular refrigerator with an ascending current of water, through which the gas rises, is fixed close to the retorts, for each unit of production—*i.e.*, 15,000 cubic metres (530,000 cubic feet) per 24 hours. The pipe, which is as short as possible, from the hydraulic main to the refrigerator slopes down to the latter in such a way that the traces of tar which are there deposited flow into the vessel and are cooled in contact with the gas. The number and length of the water-pipes—5 to 6 centimetres (from 2 in. to 2½ in.) in diameter—are such that the outer surface of these tubes, or refrigerating surface, attains 16 to 18 square metres (from 172 to 194 square feet) per 1000 cubic metres (35·3 cubic feet) of gas manufactured in 24 hours. The outside dimensions of the plant are conformably estimated. If the maximum production for which the dimensions are calculated happens to decrease, the refrigerator works all the better, and more economically as regards consumption of water.

Consumption of Cold Water.—The supply of cooling water is regulated by means of a sensitive cock, in accordance with the indications of the thermometer placed at the gas outlet. When properly regulated, the outlet temperature, at the top of the apparatus, is only 4° to 5° C. less than that at the gas inlet. Regulation should be examined when there is any great change in the atmosphere. Less water is needed in winter than in summer. The average consumption does not exceed 2 litres (3½ pints) per cubic metre of gas.

Baffle-Plates.—To increase the useful effect of the refrigerator, a certain number of horizontal baffle-plates, made of expanded metal, can be placed in the lower third of the height of the vessel. Their object is to delay the fall of the tar, and especially of the water which may have separated from the still hot gas in the higher parts, and maintain them longer in contact with the gas in the already cooled lower parts.

Slit Condenser.—As previously explained, the gas on leaving the refrigerator must be freed as soon as possible from the tarry bubbles. Consequently, the gas-mains running from the condensers to the impact condenser should be protected against the effects of possible heating. When local circumstances allow of it, the vesicular tar can be separated immediately at the outlet of the refrigerator by installing in the lower part a slit impact condenser of special type. This machine is surrounded by flowing cold water. The loss of pressure does not exceed 12 to 15 mm. (0·5 to 0·6 inch). At the outlet from this special condenser, the gas still retains 1 to 2 grammes (15 to 30 grains) of tar per cubic metre. This is the requisite and sufficient quantity for lubricating the exhauster.

End Mains.—Once the gas leaves the impact condenser, it enters the ordinary system of mains, the diameter and length of which have no further influence on the final percentage of naphthalene, whatever may be the changes of temperature it may undergo. In the event of a condenser being placed in the base of the refrigerator, complete condensation is effected in a single apparatus which occupies a very small area.

Tar from the Hydraulic Main.—As already stated, the natural solvent of naphthalene is the vesicular tar in suspension in the gas coming from the hydraulic main. Its quantity is regarded as sufficient, if properly employed; but it must be noted that the tar from the hydraulic main has the same properties. Were it brought cold into close contact with the gas, it also would impoverish it in benzol and naphthalene. This tar may therefore be regarded as a reserve solvent to bring into use in certain exceptional cases, such as in a period of great heat. For this it will be sufficient to provide a pipe to eventually carry the condensed products from the hydraulic main to the refrigerator at the height of the first baffle-plate upon which they will flow. Their fall from plate to plate will cool them in presence of the gas. It is evident that the action of this supplemental supply of washing liquid will be less effective (weights being equal) than that of the bubbles in suspension; but it will not be negligible.

Theoretical Considerations and Estimates.

To clearly understand the theory of condensation in gas-works, we must, above all, have a pretty accurate idea of the relative average quantities of the different compounds which are to be separated, or, on the other hand, to be combined. These quantities may be estimated, very roughly, as follows:

	Per 100 Kilos. o. Coal.		Per Cubic Metre of Gas.	
Volume of gas	30	cub. met.	1	cub. met.
Weight of tar	6	kilos.	200	grammes.
,, ,, ammoniacal liquor	6	,,	200	,,
,, ,, benzol fumes	1·260	,,	42·0	,,
,, ,, naphthalene	0·500	,,	17·5	,,

At 15° C., the amount of benzol fumes necessary to saturate a cubic metre of gas exceeds 250 grammes. Consequently, benzol fumes, practically, are never saturating in the gas, and they act like a permanent gas soluble in tar. The coefficient of solubility is in inverse ratio to the temperature. If, for example, a cubic metre of gas, a decilitre of tar, and 42 grammes of benzol are in presence of each other at 20° C., the weight of benzol dissolved in the decilitre of tar will be equal to the weight diffused in 500 decilitres, or in 50 litres of gas. The distribution will consequently be as follows:—

Benzol in the gas	40	grammes	95
,, ,, ,, tar	2	,,	5
Total	42	,,	100

Evidently if we increase the volume of tar brought into contact with a cubic metre of gas, or if the temperature of equilibrium is lowered, the percentage of tar in 42 grammes of benzol will augment at the cost of that of the gas. But within the usual limits for quantities and temperature, the amount of tar always

remains very small compared with that of the gas. Moreover, it must not be forgotten that the benzol cannot be separated from the gas except by dissolution of the tar. In the absence of tar, the gas would carry away all the benzol. It is quite different with naphthalene. The maximum or saturating quantities which can be entrained by a cubic metre of gas beyond the Pelouze and Audouin condenser cannot exceed, whatever may be the mode of condensation, 0·230 gramme at 15° C. or 0·632 gramme at 25° C.—viz., 1·31 and 3·61 per cent. of the total production, estimated at 17·5 grammes. The complement—*i.e.*, 17·27 grammes at 15° C., and 16·87 grammes at 25° C.—forms an integral part of the average 200 grammes of tar, which thus contains 8·63 per cent. of naphthalene when the gas is saturated at 15° C., and 8·43 per cent. when saturated at 25° C.

The methods employed for the analysis of tar do not allow an estimate being made of such small variations in percentages of naphthalene. Generally speaking, it may be said that the absolute quantities of this substance which have the effect of causing obstruction of pipes only form a very small proportion of the total weight produced in distillation. The bulk of it always remains in the tar; and the variations of the very slight amount which follows the gas, whatever their importance from the point of view of obstruction, have no appreciable effect on the composition of the average gas-works tar.

From the theoretical point of view of condensation, the naphthalene must be regarded, not as fumes more or less soluble in tar, as was done in the case of benzol, but as one of the normal essential components of the tar—this component possessing besides sufficient volatility to be diffused in the gas in very different quantities, according to the temperature. Cold, these quantities are calculated in centigrammes per cubic metre of gas; at the temperatures of the hydraulic mains and collectors, they attain several grammes.

Composition of the Gas Leaving the Hydraulic Main.—In ordinary circumstances, the gas leaves the hydraulic main at 65° C. (150° Fahr.). At this moment condensation is complete to about 5 per cent. as regards tar. In other words, in the 200 grammes of tar which accompany each cubic metre of gas, 190 grammes have already abandoned the state of vapour; but only 100 grammes have been deposited in the hydraulic main. The other 90 grammes have remained in the form of very fine drops, in suspension in the gas, which, in this case, has the appearance of a brown cloud. As for the 10 grammes of tar not yet condensed, they form an integral part of the gaseous atmosphere in which the 90 grammes float in the form of drops. The approximate composition of these 10 grammes is as follows:

Vapour of benzol	2 grammes
,, ,, xylene, cumene, and phenol . . .	3 or 4 ,,
,, ,, naphthalene	4 ,, 5 ,,

They are the most volatile elements of the average tar—those which are condensed last when tar fumes are cooled, or are the first to be thrown off when cold tar is heated. The total (say, 190 grammes per cubic metre) of these two lots of thick tar is, at 65° C., in equilibrium of tension with the gas, both for benzol and naphthalene. At this temperature it already retains the main part of the naphthalene (12·5 to 17·5 grammes), but only traces of benzol.

Clarification and Cooling of the Gas.—These preliminaries established, it must be admitted that condensation, from the industrial point of view, only comprises the phenomena which occur after the gas leaves the hydraulic main. These phenomena are two in number: (1) Separation of the tarry vesicles from the gas and their flow through the syphons; and (2) cooling. As we have already seen, the gas leaves the hydraulic main at 65° C.; and it must be cooled at least to atmospheric temperature. One can understand that clarification may be effected immediately at the outlet of the hydraulic main, before any cooling takes place, or, on the other hand, the gas can be first cooled in presence of the tarry cloud which is only separated at the lower final temperature. Let us successively examine these two cases.

In the case of clarification before cooling, the tarry vesicles can be separated from the gas at 65° in an impact condenser or in a very spacious deposit chamber, where the gas would be left for at least ten minutes without any perceptible cooling. In such circumstances, the condenser or chamber syphon gives, per cubic metre of gas, a wineglassful of hot tar (75 c.c., weighing 90 grammes), with a density of 1·2—the same kind of tar as that in the hydraulic main, very poor in benzol, and not rich relatively in naphthalene. The gas, thus clarified hot, preserves the 10 grammes of fumes already referred to. During subsequent cooling, the benzol, having no longer any tar to dissolve it, remains integrally in the gas. This is the trifling advantage derived from this mode of condensation. In regard to the 4 or 5 grammes of naphthalene, they pass, at from 50° to 40°, into the state of saturating fumes. They are purely and simply condensed into thick crystalline incrustations on the sides of the refrigerator, which the gas leaves saturated with naphthalene fumes at the final temperature. It will hold the record for danger of obstruction in the end mains. As for the intermediary hydrocarbons (xylene, cumene, phenol), they are condensed almost entirely as naphthalene; but considering their small quantity, they only ooze slightly in the refrigerator to a degree scarcely able to contaminate and colour the naphthalene crystals.

In the case of cooling before clarification, immediately after the hydraulic main there is an intensive refrigerator through which the gas rises in the opposite direction to a current of cold water. Under these conditions, the gas, the 90 grammes of heavy tar drops, and the 10 grammes of fumes cool at the same time, and in the closest contact, with great rapidity. While passing through the refrigerator, the benzol is dissolved in the 90 grammes of tarry vesicles to the extent of about 2 grammes per cubic metre of gas, if the final temperature is 15° C. In this case, the final percentage of benzol in the gas, which was 42 grammes in the previous instance, falls to 40 grammes. With respect to the naphthalene and the other intermediary hydrocarbons, they are, as cooling gradually takes place, absorbed, or rather dissolved, by the tar vesicles in suspension. The naphthalene does not undergo condensation, strictly speaking, in the state of crystals.

The gas and tar, reaching the base of the refrigerator together, are completely cooled to the inlet temperature of the water. Equilibrium is perfectly established between the respective tensions of the different volatile and soluble elements. The main part of the tar, however, is still in a state of cloud, and clarification of the gas has yet to be completed. It should be accelerated by placing an impact condenser in the base of the refrigerator, in contact with the cold feed water; for if the gas, in passing through the subsequent collectors, happened to become heated at the same time as the tarry vesicles it contains, these might, as it were, be distilled, and restore to the gas some of the naphthalene they had absorbed at the minimum temperature of the cooling water.

The syphon from which the tar from the refrigerator and condenser flows will give, per cubic metre of gas, 100 grammes of light tar (density 1·1), very fluid, and able to cool at very low temperatures without being congealed by crystallization of the naphthalene it contains. This liquor will be a solution of naphthalene in tar. It will emit naphthalene fumes at the final temperature of 15° C. But the maximum tension of these fumes will remain much below that which pure naphthalene would give.

Inconvenience and Danger of Slow Cooling.—Let us note that at the top of the refrigerator we have 90 grammes of thick tar and 10 grammes of fumes. Below, these two combined quantities form 100 grammes of fluid light tar at the syphon feeding the condenser refrigerator. The phenomenon produced is then a real washing of the gas by 90 grammes of cooled thick tar. This washing is rapid and easy, thanks to the extremely divided state of the washing liquor and the infinitely close contact with the gas. Evidently washing will only have its maximum effect when all the liquor is kept in contact with the gas until complete cooling has taken place.

If, before reaching the refrigerator, the gas passes very slowly through collectors of large diameter, a part of the washing liquor will have time to deposit and flow away through the syphons before being cooled, and consequently before being able to act as a naphthalene absorbing agent. When, further, the naphthalene begins to condense copiously, it will only meet with a small residue of cold tar, in which it will have to concentrate in an over-rich or even supersaturated solution—*i.e.*, capable of liberating, at the final temperature, naphthalene fumes with a tension equal to that of pure naphthalene. As the result of the prejudice which has so long prevailed in the gas industry in favour of slow and gradual cooling, the phenomenon which has been analyzed occurs more or less in most gas-works, and is perhaps the sole cause of the troubles due to naphthalene.

Ammoniacal Condensation.—There is complete analogy between absorption of naphthalene by the tarry vesicles and absorption of ammoniacal salts by the steam which is in the gas leaving the hydraulic main at 65° C. In condensing and cooling all this water in contact with the gas in an intensive refrigerator immediately following the hydraulic main, its maximum dissolving action is ensured for the ammonia. The question, however, is a minor one; and it need not be dwelt upon. The experimental details have been intentionally omitted from the preceding observations, and the theoretical considerations reduced to the strict minimum.

The reasons for making known the results of the work of M. Sainte-Claire Deville in connection with the condensation of tar are based upon the capital fact that the question now seems to have altogether left the domain of pure theory. We were able, in fact, practically to obtain in daily work in plant recently constructed, the complete realization of the conclusions arrived at by our Engineer-in-Chief at La Villette. The new retort-houses Nos. 3 and 4 at the works at Le Landy, representing a production of 360,000 cubic metres (about 12¾ million cubic feet) of gas per 24 hours, were, at the outset, equipped for the application of the principles described in this paper. Results hitherto attained confirm, in all points, those already realized at the experimental works at La Villette, near Paris.

Transporting a Large Gasholder.—In the construction of the new gas-works at Helsingfors, Finland, an old gasholder has been shifted bodily, and transported by water, instead of being taken apart and re-erected. The holder has a diameter of 45 feet and a height of 25 feet. It was raised and placed on a track of four rails, 200 feet in length, on which it slid down to the sea on an incline of 1 in 14. The holder was afterwards towed by a steamer over to the new gas-works, a distance of 2½ miles. The banks there being swampy, an inlet was excavated, and the holder was beached at high water. The structure was then pulled up an incline into position. Though the operations were somewhat involved, according to the "Journal für Gasbeleuchtung," the whole cost did not amount to much more than £300.

RETORT-CHARGER FOR SMALL GAS-WORKS.

Under the title of "A Retort-Charging Machine with Divided Scoop (System Dunkel)," a paper was read at the annual meeting of the Société Technique du Gaz by M. Léon Visinet. We have modified the title to that of the above heading, because it seems to us more readily to give an idea of the general scope of the charging-machine referred to. The divided scoop of manual machines has long been known and used in British gas-works; and we do not know that any particular claim is made in respect of the scoop of the machine described. But the title chosen by the author of the paper would seem to indicate that he attached considerable importance to the division of the charging-scoop. He describes the charger as adopted in the Pecq Gas-Works, where it serves seven beds of retorts in all, and requires the attention of two or three men.

Engineers, he says in his paper, seem for some time past to have been turning their attention a little to small gas-works, after having more particularly specialized in improvements in mechanical conveying in large works. Among the many applications of mechanics in medium-sized works, one of the most important is certainly that for the charging of retorts. The problem presents, indeed, numerous difficulties. The apparatus, being exposed to all kinds of treatment, ought to be very strong, so much the more as it is, in some sense, the heart of the manufacture. But to its strength it must join great pliability, and consequently comparative lightness. The apparatus described, he thinks, shows real improvement on these lines. It is divided into three parts, each of which has a definite function. [Some details of the machine are shown in figs. 1 and 2.] There is the runway on which the traveller moves, which itself supports a carriage bearing the divided scoop.

The runway (as seen in fig. 3) is supported on one side by brackets fixed to the buckstays, and on the other by pieces let into the wall. The traveller consists of two channel irons, perpendicular to the runway, with their wings facing inwards. It moves on four wheels, actuated by a wheel having an endless chain held by the stoker controlling the machine. The carriage runs on the wings of the channel irons of the traveller, and is also worked by an endless chain. In the middle of the carriage is fixed a vertical shaft carrying a framework of two vertical and parallel channels, between which glides the mechanism bearing the scoop. Lifting tackle, with its brake, raises and lowers the mechanism, which is hung by a steel cable round a drum worked by an endless chain. The whole framework can pivot round the vertical shaft, and the scoop can be pointed in any direction. Three rollers on a horizontal circular track under the lifting carriage ensure the framework being kept vertical.

The scoop is divided into two similar parts overlapping at the bottom, and when closed being in the form of a ⊔. These two parts, when discharging, open from the inside towards the outside, as shown herewith: ∪ as closed; ⋎ as open. By this means, the coal is thrown along the sides of the retort, and a heap in the middle is avoided. It is better spread, and the make of gas shows the effect of it. The scoop is made of very strong sheet steel; and its horizontal or inclined position is controlled by a lever which can be instantly worked. The capacity of the scoop varies, according to the shape of the retorts, from 150 to 250 kilos. (say, 3 to 5 cwt.).

To open the scoop, hand power is applied to one of the scoops by means of a handle lever, and is transmitted to the second scoop by two elliptical notched wheels. By this means, one of the scoops turns more quickly than the other, and there is no fear of them clashing together. When once the scoop has been opened inside the retort, it is kept in this position by a ratchet and catch fixed on one of the supporting shafts and controlled by

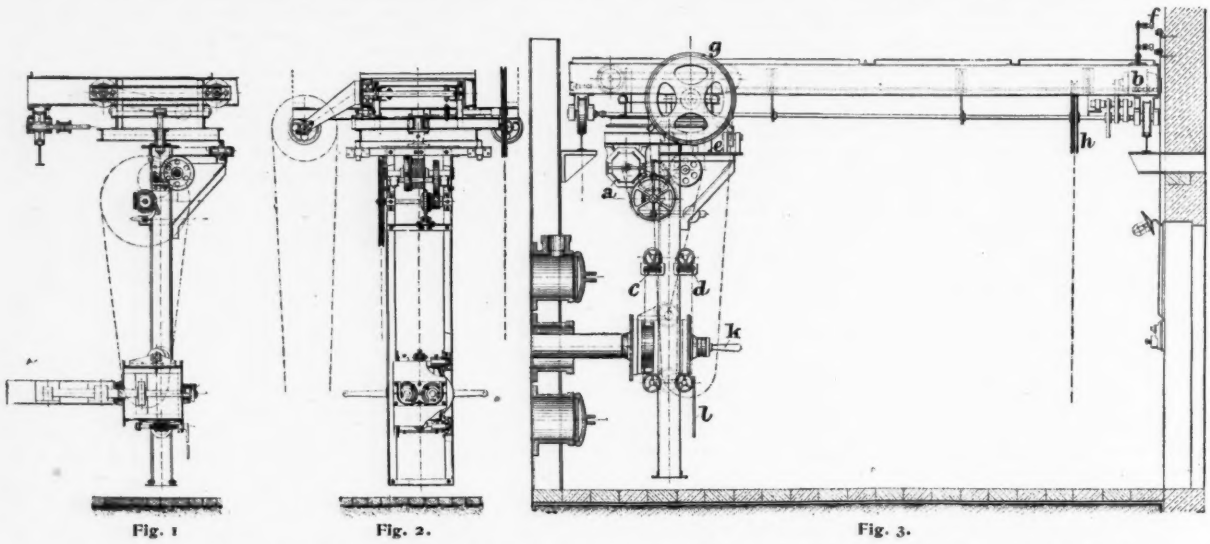


Fig. 1. Fig. 2. Fig. 3.

REFERENCES: *a* Motor of 1¾ H.P. or lifting and lowering the scoop. *b* Motor of ½ H.P. for travelling. *c* Controller for motor A. *d* Controller for motor B. *e* Magnet for releasing brake. *f* Conducting wire. *g* Hand chain-wheel for moving carriage. *h* Hand-wheel for travelling. *k* Lever for opening scoop. *l* Adjusting gear.

Dunkel's Retort-Charging Machine with Divided Scoop.

the man charging. Ball-bearings are used for all the important movements.

The charging can be very easily done with two men, though a third man can, when it is possible, lend a hand in closing the retort-lids. It is arranged to charge at one time the retorts at the same height. The scoop is brought to the required height, and led in front of the retort to be charged. Any difficulty in taking up the required position can be avoided by lining-up an arrow on the traveller with another on the runway or front of the bench.

The author then proceeds to describe in some detail the duties of each stoker, and his position when the charging is done by three men, as at the Pecq Gas-Works. The actual charging there is done by two men, because the third man only assists when he sees the scoop about to be withdrawn. He also opens and cleans the lids and ascension pipes.

A charging machine can serve without loss of time a bench of five or six beds; if needs be, even ten beds. The time required to charge a retort by two men accustomed to the work and with the retort open is about 1½ to 2 minutes from the first shovel-full of coal to the closing of the lid.

The machine can also be worked by electricity, as indicated in fig. 3. The lifting of the scoop and the travelling are done electrically by two motors—one of 2 H.P. for lifting and another of ½ H.P. for the traveller. All the other operations are effected by hand.

A slight inconvenience in the use of the machine at the Pecq Gas-Works has been experienced. If the man charging has not the arrows in proper line, and pushes the scoop forward too quickly, it knocks rather violently against the bottom of the retort. This has been remedied by two springs against which one of the cross bars of the carriage can butt.

At Toulon, there are four of these machines working on four benches of five beds of eight retorts. They have proved of great value to the Toulon Gas Company, particularly in the charging of twin retorts (consequent upon the changing of the beds of seven's to beds of eight's), and in reducing the loss of gas while the second of the twin retorts is being charged. The staff at Toulon has not been reduced, owing to special considerations there; but the amount of coal carbonized has been increased, effecting a saving of two beds during the winter, the equivalent of a labour saving of 180 stoker-days.

At the Chartres Gas-Works, large makes of gas per ton have been obtained (from 31 to 33·5 cubic metres per 100 kilos. of coal carbonized), and the Cie. Centrale du Gaz Lebon have put in these machines at Algiers, Oran, and Dieppe. The Compagnie Lumière et Eau are the sole makers in France of this system of charging machines.

Manchester and District Junior Gas Association.—We learn from the Hon. Secretary (Mr. J. Alsop, of Stockport) that the next meeting of the Association will take place on Saturday, when, on the invitation of Mr. John Chew, the Gas Engineer to the Corporation of Blackpool, the members will visit the gas-works in that town. As some interesting alterations are now in progress under Mr. Chew's supervision, a good opportunity will be afforded of seeing extensions actually being carried out.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

The Annual Meeting of the Association was held at the Westminster Technical Institute last Friday—the PRESIDENT (Mr. L. F. Tooth) in the chair.

After the adoption of the balance-sheet, the following were elected as Officers and Council for the session 1912.

President.—Mr. J. G. Clark (Gaslight and Coke Company).
Senior Vice-President.—Mr. D. J. Winslow (Lea Bridge Gas Company).
Junior Vice-President.—Mr. S. A. Carpenter (North Middlesex Gas Company).
Council.—Messrs. F. Ainsworth, T. F. Canning, G. F. Cox, F. A. Frost, P. J. Smithers, E. G. Stewart, W. Upton, W. H. Vanner, and L. F. Tooth and W. J. Liberty (*ex-officio*).
Hon. Secretary.—Mr. E. Scears (Hampton Court Gas Company).
Hon. Treasurer.—Mr. J. Hewett (South Metropolitan Gas Company).
Hon. Auditor.—Mr. E. G. Merry (Gaslight and Coke Company).

Mr. J. G. CLARK, having taken the chair, called upon Mr. W. J. Liberty (Past-President) to move a resolution.

Mr. LIBERTY said it was his privilege, as the immediate Past-President, to move a resolution of thanks to the retiring President. Mr. Tooth came into office with high aims and ideals with regard to the Association, and he had carried them out. He had had a strenuous year of office, as a glance at the now exhausted programme would show. Apart from the papers, which had been of an exceedingly high character, there had been a host of important matters to arrange, which had entailed an enormous amount of personal work on the President; but the pleasure of doing it had made it less a task. Then the President had taken up the question of a fund for the benefit of the family of the late Mr. Rothwell; and it was attributable to his efforts that the fund had been the success it had. In fact, he would go further, and say that, had it not been for Mr. Tooth, there would not have been a Rothwell Fund. He therefore had much pleasure in moving: "That this annual general meeting of the London and Southern Junior Gas Association tenders its best thanks to its retiring President, Mr. L. F. Tooth, for the manner in which he has carried out the duties of his office during the past year, and especially thanks him for all the personal labour he has put into the various important events during the session now closed, and his efforts in originating and carrying to a successful issue the Rothwell Fund." He included in his resolution that the vote be suitably inscribed, signed by the President and Secretary, framed, and presented to Mr. Tooth.

Mr. S. A. CARPENTER seconded the vote, and it was cordially agreed to.

Mr. TOOTH, in reply, thanked the mover and seconder for their kind words. He said he had set out at the beginning of his year of office to do his best for the Association; and it was some satisfaction to know that he was leaving the chair with the good wishes of the members. It had been an arduous year; but the work had been a pleasure, and it had been made possible by the unanimity of the Council and the help of the Secretary.

Mr. D. J. WINSLOW then moved a vote of thanks to Mr. S. A. Carpenter, the retiring Hon. Secretary, for the number of years he had held office; and this was carried.

Votes of thanks were also passed to Mr. J. Hewett, the Hon. Treasurer, Mr. E. Merry, the Hon. Auditor, and the Council.

Mr. CLARK thanked the Association for having elected him as President.

A Thermostat in Operation in Public.

In the windows of Messrs. John Wright and Co.'s premises in Queen Victoria Street, there is now to be seen in operation all day long a thermostat controlling the consumption of gas beneath a gas-boiler by the heat of the water in the boiler. As probably very few of the general public have seen a thermostat in operation, the exhibition is not only novel but distinctly instructive; and we are not surprised to learn that it is attracting a considerable amount of attention. The appliance shuts off the gas promptly on the water reaching a predetermined temperature, and just as smartly opens the gas-valve on cold water flowing in. It is this quickness of action that admits of the entire cycle—from cold to hot water or *vice versâ*—being shown in the space of one minute. The exhibit is made specially attractive by the way in which it is fitted up. There is the boiler completely connected and the gas alight, while at the side of it is a lavatory basin with hot-water tap. At the back of the basin is a small curtain through which an artificial lady's hand comes each minute and turns on the handle of the tap; the issue of hot water, with corresponding inflow of cold, causing the thermostat immediately to open the gas-valve. The same hand then closes the tap; and after as brief a time as 45 seconds, the cold water that entered is heated up, and the gas-valve again closed by the thermostat. The objects of the exhibit are, first, to show the efficacy of Messrs. Wright's "Sun" boiler; and, secondly, to demonstrate the precise and constant action of the thermostat with which the boiler is fitted.

DISTANCE IGNITING SYSTEMS.

A paper on distance igniting devices for gas-lamps was read at a recent meeting of the Bochum District Section of the Association of German Engineers by Herr Schiefer, Lecturer at the Royal Engineering School at Cologne. The following particulars of the paper are taken from the "Zeitschrift" of the Association.

The author pointed out that it was essential that the igniting and extinguishing of gas-lamps should be accomplished from one centre if gas lighting were to compete on equal terms with the electric light. The first attempt at igniting gas-lamps at a distance was made in 1850 by Professor Klinkerfuss at Göttingen; but it does not appear to have been successful, and the question seems to have lapsed altogether until a patent was taken out in the year 1878. It was not, however, until the introduction of incandescent lighting, and the employment of bye-pass jets, that any real advance was made in perfecting devices for lighting gas-lamps from one centre. The ignition of lamps at a distance can be effected: (1) By alteration of the pressure of the gas; (2) by appropriate clockwork devices for opening and closing the gas-tap; (3) by compressed air or electricity.

Appliances falling under the last two groups have been introduced only to a limited extent, owing to their lack of adaptability or to their too high cost of installation or maintenance. Practically the only igniting appliances which at present come into consideration for town or works installations are those depending on change of pressure of the gas; and these may be divided into three types—viz., (*a*) those having stretched membranes, such as the Bamag and Pintsch appliances; (*b*) those with weighted leather bags, as the Gascho and Zickwolf appliances; and (*c*) those with a weighted bell sealed in liquid, as the Zickwolf appliance of this type.

The essentials of a good distance lighter are, according to the author, as follows: It must be proof against any unintentional derangement. All the parts must be readily and cheaply replaceable. Its construction and manipulation must be simple; and it must not need a skilled workman's attention. It must also be capable of being installed by a not-specially-trained fitter. It must be susceptible of being readily adapted to work at any desired pressure, and, once set for a particular pressure, must remain unaffected by outside influences. Should ignition fail to take place, there must be no obstacle to lighting by hand. It must occupy little space, so that it may not interfere with the lighting effect of the lamp. It must be of durable and solid construction, and unaffected by changes in the weather. It must not be readily obstructed by naphthalene, and, if obstructed, must be easily cleared. Finally, it must in a short time repay the cost of its installation by the saving in wages and gas consumed which it effects.

The author proceeds to give a brief description of some of the best known ignition appliances. The Bamag distance lighter (which was more fully described in the "JOURNAL" during 1907, Vol. XCIX., p. 568) consists of a cast-iron case divided by a diaphragm into two chambers. The diaphragm is made of fine, firm, uniformly closely-woven material, impregnated with varnish. The gas-pressure acts on one side of the membrane, on the other side of which a spiral spring presses. The tension on the spring can be readily altered. As soon as the gas-pressure exceeds the pressure of the spring, the diaphragm is moved, and its movement is transmitted by a lever and pinion wheel to the gas-valve, so that the latter is opened or closed by the upward and downward movement of the diaphragm. The distance lighter made by Julius Pintsch is of the same type; it is so constructed that the increase or diminution of pressure will extinguish a certain number of lamps which are required for use in the evening only, while leaving the all-night lamps alight. The first change of pressure ignites all the lamps; the second extinguishes the half-night lamps, while the third extinguishes the remainder. [The author does not mention that the "Bamag" appliance is also supplied with this action.]

The second type of distance lighters includes the "Gascho," in which a leather membrane or bag, when subjected to an increase of gas-pressure, raises a little valve which opens the gas-way to the burner. The gas supply to the pilot-jet is not affected. The succeeding change of gas-pressure closes the gas-way. The next apparatus referred to is Dr. Rostin's "Meteor," which has been described in the "JOURNAL," Vol. C., p. 477. In this apparatus, the gas-pressure has to raise an equivalent load, which when moved operates a weighted lever, which actuates a tap by which the gas supply is turned on or off. The author next describes fully the two types of "Zickwolf" distance lighter. The one with a floating bell is specially intended for small districts. [An abstract of the patent specification of this type of Zickwolf's appliance was given in the "JOURNAL," Vol. XCIX., p. 513.] The bell is sealed in mercury, and is weighted so that it is not lifted until the pressure is 2-10ths to 4-10ths of an inch above the ordinary gas-pressure. When the pressure is increased, by (say) 4-10ths, the bell is raised, and a rod attached to it operates cranked levers, by means of which a conical valve on the gas-way to the burner is opened and the pilot-jet is extinguished. The bell falls as soon as the gas-pressure is reduced to normal, and the next increase of pressure raises the bell, and the levers then operate with the reverse effect—viz., they close the gas-way to the burner and open the bye-pass. The levers are stated to be operated with very little expenditure of power, and an external lever is provided by which the lamp can be lighted if required by hand without

interfering with the operation of the pressure lighter. Similar apparatus is made in which the levers are actuated by a leather diaphragm instead of by the floating bell.

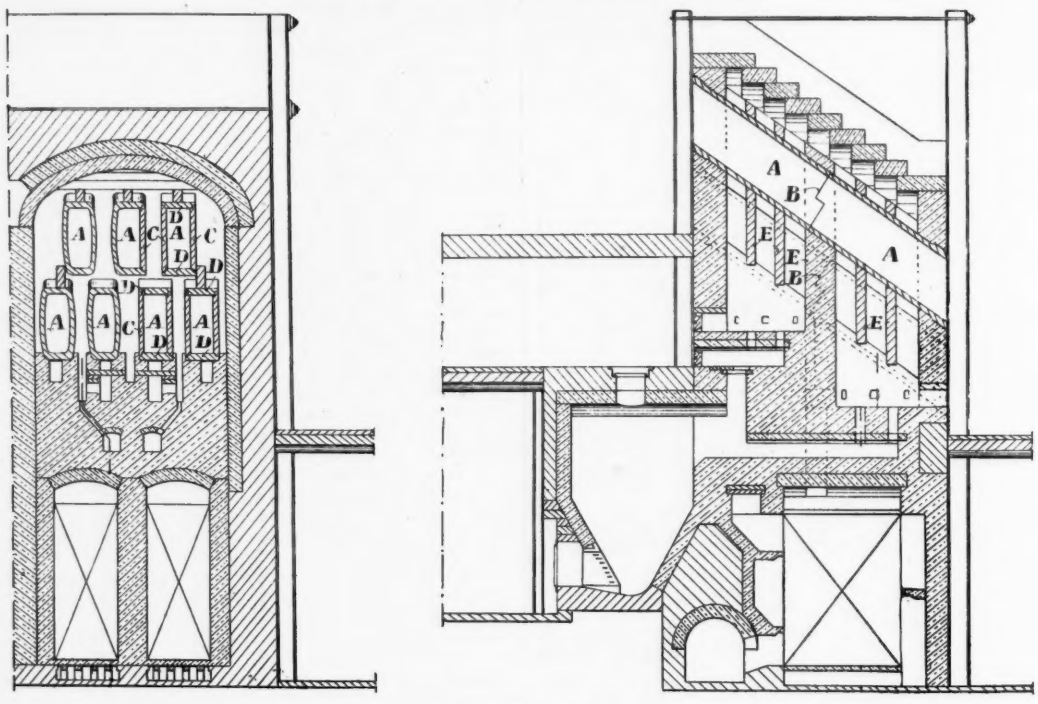
A compressed-air distance lighter is made by the firm of F. Siemens, of Dresden. It involves the use of a separate air-pipe to the lamps. Increase or decrease of the pressure of the air raises or lowers the level of the mercury contained in an iron vessel, and the gas-taps are opened or closed through the change of level of the mercury. Of electrical appliances, two are mentioned by the author. The first, devised by Herr Friedrich Lux, of Ludwigshafen, opens a conical gas-valve by means of an electro-magnet, while at the same time a platinum spiral is raised to incandescence to ignite the gas. The gas is extinguished by an electro-magnet releasing the conical gas-valve and thereby closing the gas-way. A second electrical device is the "Multiplex," in which the ignition of the gas is effected by sparks passing between two electrodes from a high-tension alternating current produced by a small induction apparatus. These electrical appliances are, in the author's view, more suitable for private installations than for public lighting.

INCLINED RETORTS FOR HEAVY CHARGES.

In view of the tendency on the part of gas makers to employ heavier charges of coal, it occurred to M. Hovine, of Paris, that the advantages claimed for the new practice might be obtained with inclined retorts by making a change in their shape. At present they are usually made wider than they are high; and this has rendered their complete filling somewhat inconvenient. In M. Hovine's setting, the reverse is the case. He has effected the change without altering the regenerator or producer, or the charging and discharging arrangements.

The accompanying illustrations show a setting of seven retorts in an arch large enough for nine of the ordinary type; fig. 1 being a transverse section on the line X of fig. 2, which is a longitudinal section on the line Y of fig. 1.

The retorts A are set parallel to each other in two superposed rows, instead of in three rows as usual in settings of nine; and the angle of inclination is about the same as that generally adopted. The retorts are made in a single piece, or in two or three sections joined end to end, as shown at the line B in fig. 2. They can also be formed of pieces, as C D in fig. 1, jointed like ordinary muffles. Cross-bracing walls E (fig. 1), made of fire-bricks or special blocks, ensure the stability of the structure, and form covers to the joints when the retorts are made with assembled pieces. The retorts are charged at the upper end by gravity, which gives the coal sufficient impetus for completely filling them, instead of merely covering the bottom.



Hovine's Inclined Retorts for Heavy Charges.

BREEZE AND TAR PAVING FOR GAS-WORKS.

In the gas-works at Angers, there has been used for some few years a mixture of breeze and tar for surfacing the ground; and it has been so successful—the material being durable, clean, and economical—that M. Hedde decided to bring it under the notice of his colleagues in the Société Technique du Gaz at their annual meeting last week. The mixture consists of 95 per cent. of breeze to 5 per cent. of tar. M. Hedde stated that it is not necessary that the ground on which the material is to be used should be made perfectly level, as this is done by the process. The surface is simply pressed lightly to give it a consistency, the mixture is spread to a thickness of 2 inches, and then "punned." This operation should go on until the ground has a certain consistency; time and traffic will do the rest. It is in places where traffic is greatest that the mixture acts best and most rapidly. It is advisable, however, for the space of about a month, to avoid taking heavy loads over the newly-treated ground. At Angers works, the mixture has been used in the coal and coke stores, cart-sheds, &c. No better places could have been chosen for the application of the material; and for a period of eight years the ground has resisted perfectly the heavy traffic over it, and the surface has retained its uniformity. In the coal-stores, the men prefer the ground made with this material to any other, as it not only facilitates the shovelling of the coal but is soft to the feet and easily cleaned.

The ingredients may be mixed by hand or with a mortar-mill; the latter being the method adopted at Angers. It is necessary, however, to take certain precautions to regulate the flow of the tar, and not allow the quantity to exceed the proportion already indicated. An excess would cause the ground to soften under the continued action of heat. Hardening of the surface may be assisted by a facing of lime.

In order to give the members an idea of the cost of treating ground in the way indicated, the author submitted the following figures: A square metre (1·2 square yards) of ground 2 inches thick contains 3·5 kilos. (7¾ lbs.) of tar at 8 frs. per 100 kilos., and 67·5 kilos. (151 lbs.) of breeze, at 11 frs. per metric ton. Labour costs 40 c. per square metre. The total outlay was consequently 1 fr. 40 c. per square metre, as compared with 6 frs. for cement facing and 9 frs. for paving.

Trees in watersheds have a beneficial effect, according to the last annual report of the Board of Water Commissioners of Middletown (Conn.), in which it is recommended that 46,725 trees should be set out at the Higby reservoir. The benefits to be derived from a growth of trees on the watershed of the reservoir are said to be the following: The roots of the trees hold the soil, and to a great extent prevent its wash into the reservoir. The leaves and twigs that fall form a covering to the ground that protects the soil from the wash of the rainfall. They also absorb a large quantity of water, and let it flow off gradually to the reservoir, thus continuing to be a benefit to a water supply for a long time after cleared land would be dry.

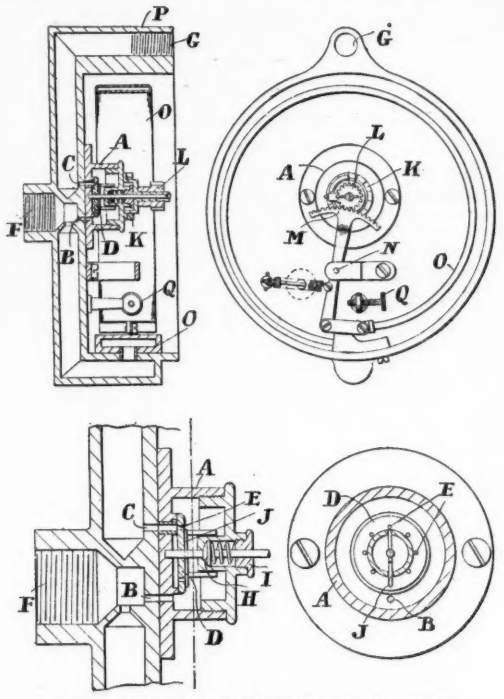
REGISTER OF PATENTS.

Control of Gas Lighting Systems.

MACKAY, J., and ANDERSON, J., of Edinburgh.

No. 7727; March 30, 1910.

This invention relates particularly to gas systems operating under high pressure, with the object of obtaining a "convenient and reliable construction by which the gas may be turned on or off at predetermined times or when desired."



Mackay and Anderson's Gas-Lighting Controller.

The illustration shows one construction suitable for high-pressure gas systems, where the valve is formed of a cylindrical casing A with inlet and outlet ports B C in the base. Over the outlet port, a face-valve, consisting of a disc D with a number of perforations E in it, is arranged to be rotated. When the disc is so rotated that a hole in it coincides with the outlet port, gas passes from the inlet F and port B to fill the small casing; then through the outlet port C and a suitable lead G to the burners.

Rotation of the valve is effected (without escape of gas) through the arrangement of a ground cone H, mounted in the cover I of a screwed-on top to the small cylindrical casing containing the disc valve. This cone acts as a stuffing-box and forms a gas-tight joint. It offers practically no resistance and friction with respect to the rotation of the valve, "so that very little power is required to operate the controlling apparatus."

The disc valve is connected to the stem of the cone by a pin. The rotation of the valve is effected by a pawl and ratchet arrangement on a crown-wheel K; the pawl being preferably kept in contact with the wheel by a light spring, so that the apparatus can be used in any desired position. The pawl is attached to a pinion L, which is rotated by a circular rack M pivoted at N and moved by a Bourdon tube O on the application of sufficient pressure. The Bourdon tube is preferably a thin, flat tube of solid drawn brass. It is arranged, together with the operating parts, inside a circular cast-iron case P (which need not necessarily be gas-tight, but can be sealed to prevent tampering with the contents in the usual manner). An adjustable set-screw Q is provided to adjust the permissible travel of the valve.

In operation, either at some predetermined time (by an automatic arrangement) or when desired, sufficient pressure is applied to the controlling apparatus, which effects a partial straightening of the Bourdon tube and the consequent rotation of the crown-wheel and disc valve to open the valve if it were before closed, or close the valve if it were before open. Thus the same kind of operation performs both functions.

Continuously Working Vertical Gas-Retorts.

WOODALL, H. W., of Lytchett Matravers, Dorset, and DUCKHAM, A. M'D., of Little Bookham, Surrey.

No. 7919; April 1, 1910.

The different characteristics of coals and their behaviour during the process of carbonization has, the patentees point out, become much more apparent and important since the retorts have been set at an incline or vertical in order to obtain the discharge by means of gravity. When continuous working in vertical retorts (which are much higher than they are long) was first introduced, no great importance was attached to these varying properties of different coals; but from their experience, they have found that:

(1) The coke from some coals is softer than that obtained in horizontal retorts. The reason for this is that the skin-friction exerted by the sides of the retorts on the charge as it descends prevents the superincumbent portion of the charge putting any effective pressure on the portion that is in the state of being formed into coke. This is accentuated by the fact that all such retorts enlarge in cross section towards the bottom; so that the charge, as it continuously descends, has freedom to expand and to free itself from any such pressure.

(2) That with some coals, which very readily soften and become a tarry mass, this skin-friction is so great that such portion of the charge does not descend of its own accord while in such state.

(3) That with other coals the coke formed, even when continuously moving, is so large that, with the existing size of retorts, great difficulty is experienced in getting the coke to discharge evenly and freely.

They have, by experiment, discovered that they can overcome the whole of these objections by increasing the cross sectional area of the retort. This has to be done by increasing the major axis, as the minor axis must, in order to allow of the ready passage of heat through the charge, be of the smallest dimension compatible with the unrestricted descent of the charge in the retort.

Whereas hitherto the ratio between the major or minor axes of the elliptical cross section of such a retort—which is, of course, quite distinct from a coke-oven or a smelting furnace, for both of which a high form, considerably longer than wide, has been suggested—has not exceeded 3 : 1, according to their invention this ratio exceeds 5 : 1. When these dimensions are adopted—regard being had, of course, to reasonable absolute values—the coke is of greater density than that produced in retorts hitherto constructed. For instance, an improved coke has been made in a retort having at its mouth a major axis of 54 inches and a minor axis of 9 inches. Another considerable advantage accrues from such dimensions—namely, that if the coal is charged from a position above the minor axis, the larger lumps roll away towards the ends of the major axis; so that at the ends of the cross section the gases find a considerably easier passage than is the case when there is no such sorting of the lumps constituting the charge. The beneficial effect of this comparatively free passage is already known in intermittent systems.

The invention is not limited to a cross section which is truly elliptical. It may be preferable to construct the retort of a cross section, the sides of which are parallel, or substantially so, and the ends more or less curved. The ratio named then becomes that between the length and the width of the cross section. The cross section in question is that at the mouth of the retort, and increases downward, as is usual.

Vertical retorts falling within the dimensions defined in their claim are described in patents No. 972 of 1863 and No. 3579 of 1875; but in their view, these specifications do not describe continuously working retorts, to which alone the present invention relates.

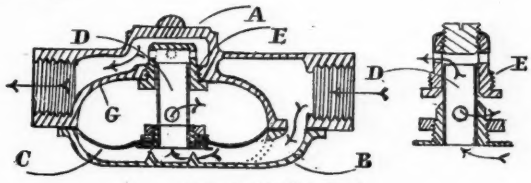
[In connection with the above invention, attention may be directed to the patentees' application, No. 9494, April 19, 1910—*ante*., p. 458.]

Diaphragm Governor for Gas.

PURVES, T. H., of Aston, Birmingham.

No. 10,380; April 28, 1910.

These governors have a flexible diaphragm to which is connected a cylindrical slide-valve, so combined that the regulating means for controlling the flow of gas cannot be altered except by disconnecting the casing.



Purves' Gas Governor.

A governor constructed according to the invention is shown in central vertical section; also a central vertical section of a valve arrangement for use with high-pressure gas.

In the interior of the body of the governor is formed an annular web G, around the depending edge of which is secured the outer edge of the diaphragm C—the arrangement being such that the diaphragm is arranged in parallelism with the axes of the inlet and outlet apertures. The cylindrical valve D is secured at its lower end to the diaphragm, and its upper end is slidingly mounted within the bush E, which has its upper end closed and the wall provided with openings through which the gas passing to the outlet is regulated by means of the valve. The bush is adapted to be screwed into the web G—being provided with a hexagonal shoulder to facilitate the screwing action. To secure the diaphragm to the lower end of the valve, the diaphragm is adapted to be gripped between two flanges—one fixed (in relation to the tube) by being formed integrally with a ring secured to the tube, the other movably mounted so that the flanges may be pressed together by a lock-nut. The under side of the casing is provided with a detachable plate or cover B, secured in position by screws; and in order that the diaphragm shall not, by virtue of the weight of the cylindrical valve, rest upon the cover B, projections are formed on the inner side of the cover upon which the lower of the flanges rest when the valve D is in its lowest position. Openings are formed in the valve through which gas passes into the enclosed chamber on the diaphragm, and the gas that enters the inlet passes both to the under and upper sides of the diaphragm and through the apertures in the bush E on its way to the outlet.

In the arrangement adapted for use in regulating high-pressure gas, the bush E is provided with a screw plug, so that the face of it may be raised or lowered. The under side is provided with conical seatings, with a ring secured to the inner end of the valve-tube D having corre-

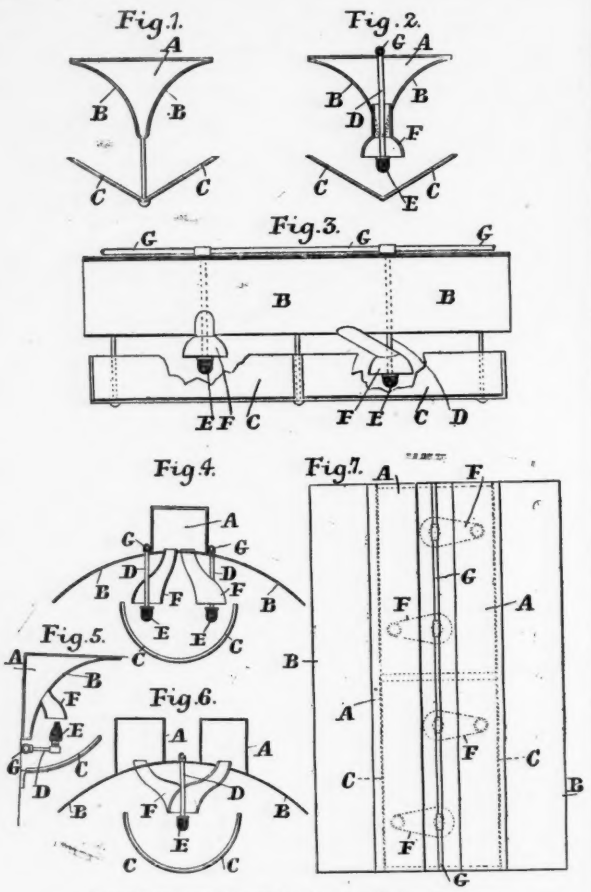
sponding conical edges. Thus, by regulating the position of the screwed plug, the upper edge of the valve-tube and surface may be placed in such relation to each other that when the valve is nearly closed the conical surfaces engage with each other, and so prevent any possibility of the high-pressure gas escaping except by way of the valve.

Gas Lighting and Ventilating System.

BROADBERRY, A. E., of Tottenham, and GLOVER, T., of Edmonton.

No. 10,806; May 2, 1910.

This invention relates to apparatus for gas lighting and ventilating rooms, shops, halls, and places in which the fumes are conveyed by flues to an uptake or chimney, and the burners are provided with a reflector above and below "so that the room will be illuminated by a well-diffused light and be efficiently ventilated." The object of the invention is to construct apparatus "which can be easily and quickly applied without injuring or altering the room except cutting a hole into the chimney; and any or all of the gas-lights can be employed as desired—the products of combustion passing to the ordinary chimney or uptake or to a special chimney or uptake should there be no ordinary chimney in the room."



Broadberry and Glover's Gas-Ventilating System.

Fig. 1 is an end view of a flue and reflector without the gas pipe and burners. Fig. 2 is an end view of a flue and reflector with the gas-pipe and inverted burner; the branch gas-pipe passing down the chimney over the mantle. Fig. 3 is a side elevation of one segment of a flue and reflector showing the gas pipes and burners, with the gas-pipe passing into the chimney, but not completely through its entire length. Fig. 4 is a section of a modified form of flue carrying a reflector and showing the burners and chimneys as in fig. 3, and with the under reflector in position. Fig. 5 is a section of flue and reflector with burner suitable for the cornice of a room. Figs. 6 and 7 are elevation and plan showing an alternative arrangement of flues and burners to that shown in fig. 4.

The flue A is made in segments, so that they can be easily fitted together; the segments, if the flue is to be fitted across the room, being approximately triangular in cross section, with curved or angled sides, as at figs. 1 to 3, or square as at fig. 4; or if for the wall or cornice of a room, approximately of a shape that the front is angled or curved as at fig. 5. The under or side surfaces B of the flue are provided with a reflecting surface; or if the flue be square, a reflector B may be fitted as at fig. 4. Each segment is provided with holes through the meeting edges of the sides, also (in some cases) through the top. The flue is arranged along the ceiling of the room with one end leading into the chimney; and below the flue, at a suitable distance, there is arranged a trough-shaped reflector C, of opalescent glass.

For inverted burners, as also for upright burners, in one construction a branch gas-pipe D is passed through each hole or some of the holes in the segments; and at the lower end the burner and mantle E are surrounded by the usual globe or chimney F, which is held to the segment in such a manner that the products of combustion pass into the flue, either direct as at fig. 2 or through the chimney F, being directed into another hole in the under side of the flue other than that through which the gas-pipe passes, as at figs. 3 and 4. Each gas-pipe is connected to one G common to all or else to separate main pipes controlled by taps, so that all the burners may be lighted at once, or any of them lighted separately.

In figs. 6 and 7, two flues A are provided; and the main pipe G and branch gas-pipes D are arranged centrally along the reflector B, and the chimneys F are led alternately left and right into the flues A.

The flues being made in segments, they can be easily fitted together and secured to the ceiling or wall. The patentees propose to make the segments complete—*i.e.*, flue segment A, gas-piping D, and burner and reflector segment C—so that each complete segment can be placed and secured in position and connected to the main gas-pipe G or to pipes in the chimney proper—the only after-business being the attachment of the mantles or burners and globes.

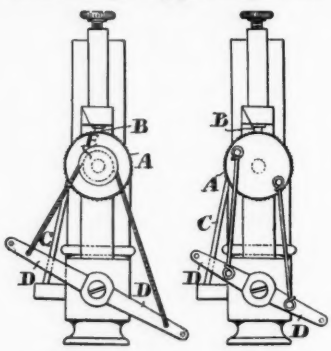
Gas-Igniters.

URBAN, A., and HAMBURGER, F., of Vienna.

No. 28,471; Dec. 7, 1910.

This igniter is of the class in which an abrading body is moved over a spark producing body—for instance, a body made of an alloy of iron and cerium. A disc carrying the abrading body and journalled in the burner frame is connected with both arms of a two-armed lever secured to the gas-cock so that the movement of the lever serving for opening the cock is directly transmitted to the disc. This connection may be effected by a rope or chain, by links or the like, or by a spring and a slotted link. In the first two cases, when the lever is moved continuously the disc moves continuously too. In the last-named case, however, when the lever moves continuously in one direction the disc is arrested at a predetermined point of its path by a stop-spring; the lever continuing to move and putting under tension the actuating spring. After the lever has thus moved through a certain angle, the disc is released, and moves under the action of the distending actuating spring with increased rapidity.

In the two modifications shown, A is a disc carrying or constituting an abrading body—a set of teeth provided on the periphery of the disc. The disc is journalled on the body of the burner. B is the spark-producing body (a piece of an alloy of iron and cerium) mounted on the burner body. C is a small igniter pipe through which escapes the gas



Urban and Hamburger's Gas-Igniter.

to be ignited by the sparks. The movement of the lever D is directly transmitted to the disc. In the first construction shown, this is done by means of a pulley E, fast on, and concentric with, the disc and a cord or perforated band having its ends secured to the lever at opposite sides of its fulcrum. In the second arrangement, the disc is connected to the lever D by links engaging pins on opposite sides of the lever and other pins on opposite sides of the journal pin of the disc.

In order to ensure a sufficient admission of gas to the tube C prior to the setting-up of the sparks which is necessary for the reliability of the device, it is preferred to offer a resistance to the movement of the cock in the beginning of its motion by means of a stop-spring or a tilting weight, which, on the latter part of the motion of the lever when the sparks have to be produced, acts to accelerate the lever. During the first part of the motion of the lever (when it moves slowly), a continuous gas current is set up, while by the rapid movement of the disc towards the end of the lever motion efficient sparks are produced.

Charging Vertical Retorts.

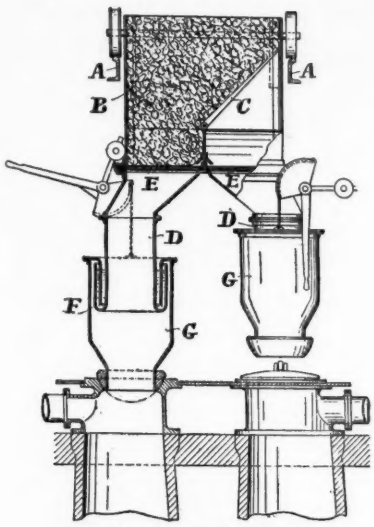
BOLZ, C., of Budapest, Hungary.

No. 28,941; July 28, 1910.

Apparatus for charging vertical retorts has heretofore been suggested (the patentee remarks) comprising a carriage adapted to run along rails above a series of retorts and itself provided with transverse rails for receiving the supporting wheels of a coal receptacle. These wheels are connected to the coal receptacle by means of eccentrics in such a manner that the receptacle can be raised and lowered as a whole, in addition to being movable longitudinally and transversely, in order to enable its conical outlet to be brought into and out of engagement with conical seats in the mouths of the several retorts. A longitudinally and vertically movable retort-charging hopper is also known wherein the hopper has a telescopic tubular extension which engages with the retort when the hopper is lowered.

According to the present invention—in order to obviate the necessity of lowering and raising the receptacle for the material forming the charge each time a retort is to be charged—the discharge-aperture of the receptacle is formed on the lower end of a funnel or tube provided with means for raising and lowering it relatively to the receptacle, and with means for forming a substantially fluid-tight joint with the recep-

tacle and with the mouth of the retort. The apparatus, moreover, comprises means for permitting lateral motion of the lower end of the funnel or tube relatively to the charge receptacle, in order to facilitate the insertion of it into the mouth of the retort and ensure a tight fit. By the invention, in addition to the greater facility of handling, escape of coal dust and gas are said to be effectually prevented.



Bolz' Vertical Retort Charger.

On hanging rails A, a travelling charging receptacle B (of known construction) is placed, so constructed that it can be used for charging two rows of retorts, for which purpose a gate C can be set in either one of two positions, so as to supply the coal to either of the two retorts shown. From B, discharge funnels or tubes D are suspended, through which, after opening either one of the slide valves E, the coal is discharged into one of the retorts. The discharge tubes are constructed in two sections connected with each other by a water seal F, allowing the lower section to be slightly raised or lowered. Furthermore, the lateral play of the seal is such that the lower section G can be slightly rocked from its position centrally of the upper part. "Such a flexible connection is advantageous because, by reason of the expansion of the structure by heat, the position of the axis of the retort to the axis of the charging receptacle is variable, and, furthermore, because it is difficult to move the receptacle so that its axis is exactly above the axis of the retorts." In order to enable the tube G to be easily inserted within the mouth of the retort, and to ensure a tight closure in case the lower section of the tube is not in a vertical position, the lower part of the tube is preferably constructed with a spherical lower face fitting in a corresponding spherical cavity of the upper face of the mouth of the retort.

The lower section can be conveniently raised or lowered by a lever and balancing weight.

By the above construction, it is claimed that escape of gas from the retort during charging is "effectually prevented." If by some irregularity a small amount of gas should escape through the charging receptacle B, "such gas cannot trouble the attendants, because the upper end of the receptacle is considerably above the heads of the latter."

Affairs of the Bungay and Eye Water Company.

It may possibly be remembered that early in the year a general meeting of this Company, which is one of the promotions of Mr. E. Oxenford Preston, was held, at which the shareholders referred the accounts, as then presented, to a firm of chartered accountants. Their report has now been issued, and is to be considered at an adjourned general meeting, convened for to-day. According to the "Financial News," the report sets forth that the contract for the works was signed by Mr. F. C. Philpots on Oct. 22, 1909; and under it the contractor undertook to construct the water-works at an inclusive cost of £22,000, of which sum £6000 was to be payable "within 28 days of the signing of the contract." This sum was paid by the Directors allotting him £2400 in fully-paid shares, £100 by the issue of a debenture to the contractor's nominee, and £3500 by cash payments made between Nov. 5, 1909, and March 23, 1910. The accountants understand "that the construction of the works has proved impossible of completion;" and, so far as they can ascertain, "the balance of liability under the contract is in no way due by the Company." From the audited accounts, it appears that, of the authorized share capital of £25,000, only 247 shares of £10 each were paid for in cash; and 5 per cent. mortgage debentures have also been issued to the extent of £1600, which apparently includes the £100 debenture issued to the contractor's nominee.

Gas-Works in Japan.—In an article on Japan in the "Financial News" on Monday last week, the following particulars were given in regard to the Tokyo Gas Company: "Gas-works were first established at Shiba, in Tokyo, by the local Government, in the year 1876. In 1885, the business was transferred into the hands of the people; and a Company, under the name of the Tokyo Gas Company, Limited, was established, with a capital of 270,000 yen. In accordance with the great business development, the capital has been increased from time to time, and now reaches 35,000,000 yen—nearly 130 times the original capital. At the end of last December the Company owned 866 miles of gas-pipe, and had supplied during the preceding six months a total of 770,345,400 cubic feet of gas."

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Stand-by Clause in the Swansea Gas Bill.

SIR,—In reading through your comments on the opposition of the Corporation to the Swansea Gas Bill, I find you have seriously misrepresented the evidence which I gave, and founded upon that misrepresentation a question which I do not think it worth while to reply to. I have no doubt whatever that this misrepresentation is quite unintentional; but I shall be obliged if you will correct it in your next issue, and I am only sorry that I did not notice it before, so that it could be corrected in the current issue.

Your remark of which I complain is as follows:

> "There was an attempt to overthrow the stand-by clause in respect of persons having an electricity supply. This was unsuccessful; but the Committee desired that it should be made quite clear that the clause will only refer to cases where gas is used as a stand-by. Mr. Stevenson was understood to say that the stand-by clause has been declared by Parliament to be unjust; and that, if it has gone through, it has only been in cases of Unopposed Bills."

The facts are as follows: A clause was inserted in the Bill and was called a stand-by clause, and which I stated was not a proper clause. Mr. Andrews justified it first on the ground of the ordinary purposes of a stand-by clause, and next on the ground that consumers using gas only for cooking or heating did not consume the gas throughout the entire year, and ought to pay for the period during which they did not consume gas. And this he admitted would include gas consumers who use oil for lighting purposes. In my examination-in-chief I objected strongly to the clause, on the grounds that it was being advocated so that the *bonâ fide* gas consumer who takes gas for cooking purposes would probably be charged the stand-by in winter, and the consumer who used it only for heating purposes in winter would be charged the stand-by in summer.

The three following questions and answers show the position which I take up upon this matter; and it is the only reasonable position which I could take up, considering that I acted for the Heywood Corporation in obtaining the first stand-by clause which was allowed:

> Q. 1643. There is nothing unreasonable, is there, in the principle of the stand-by clause?—I quite agree with the principle of the stand-by clause; but I entirely disagree with the reason given by Mr. Andrews, that *bonâ fide* gas consumers should be treated as being under a stand-by clause.
>
> Q. 1644. If I have to keep myself in a position to supply the occasional demand of one consumer to the extent that I have to spend material and capital for the purpose of supplying him, why should the other consumers pay for that?—I have just admitted with a proper stand-by clause I am agreed with you; but I do say that with a *bonâ fide* gas consumer, who takes gas for cooking in the summer, or heating in the winter, he ought not to be charged in those quarters when he does not consume gas.
>
> Q. 1648. Now, a good many of these consumers of electricity have their houses fitted with both illuminants?—Yes, I believe they do; but a good many of them will have gas, as *bonâ fide* gas consumers, for cooking. And simply because they do their lighting by electricity, they ought not to be penalized because they do their cooking by gas.

Your summaries are generally so correct and fair that I should not trouble to ask you to rectify small errors; but this, as you will see, is one which might carry somewhat grave consequences in the future if it were not now put right.

38, *Parliament Street, S.W., May* 23, 1911. E. HERBERT STEVENSON.

[We are pleased to have this communication from Mr. Stevenson, as we should be extremely sorry to be the vehicle of misrepresentation that might be brought up and cause inconvenience on some future occasion, when it might not be so easily cleared up as is immediately possible. We do not think, however, the words of the sentences quoted by our correspondent from the "Notes from Westminster" of a fortnight since will lead anyone to the conclusion that Mr. Stevenson attempted to overthrow the stand-by clause as a whole. He correctly reproduces our statement, which we do not hesitate to repeat: "There was an attempt to overthrow the stand-by clause *in respect of persons having an electricity supply*." We fail to see, however, that there is much tangibility about Mr. Stevenson's objection to the stand-by clause in regard to householders who use electricity or oil for lighting, and only employ gas for cooking in summer and for heating in winter. He would not have the stand-by clause brought into operation in respect of the disused gas-cooker in winter and the disused gas-fires in summer. But there is continuous use of gas there (no matter the purpose for which it is employed); and we should be as strongly opposed as Mr. Stevenson is to the stand-by clause coming into operation under such circumstances—where there is continuous use of gas, and where this use represents in revenue a minimum fixed sum. Mr. Stevenson's objection can be easily surmounted without depriving any gas company of the electricity part of the stand-by clause. He reminds us that he appeared on the Heywood Bill; and it is within our recollection that he gave evidence in favour of the stand-by clause in that case. This was the first stand-by clause in which both gas and electricity were dealt with; but the Mountain Ash clause should perhaps take precedence in respect of gas only. On the Heywood Bill, our correspondent did not raise any objection to the electricity part of the clause, the same as he did in respect of the Swansea clause. He

said in effect, in his evidence on the Swansea Bill, that in the case of Heywood the circumstances were different—that Heywood dealt with large mills and so forth. But since the Heywood clause was passed, the Gas Committee have arranged, and the Council have confirmed, a tariff of charges in relation to the stand-by clause ranging from 5s. per quarter for a ten-light meter to 25s. for a much larger meter, *when the consumption of gas does not amount to these sums*. The 5s. charge and the ten-light meter look suspiciously like some other service than that to a mill or factory. We see no hardship to any consumer in such a condition as this; and it would be quite an easy matter to make the figures apply to the consumption over longer periods of the year. We can quite conceive instances where consumers, using some other form of illuminant than gas, may have a meter and a cooker put in, and only use them on rare occasions. This would be distinctly unfair to the company and to other gas consumers. We asked Mr. Stevenson a simple question in "Notes from Westminster" to which he refers; but he does not think it worth while to reply to it. We will not press him to do so. It is sufficient for our purpose to emphasize that Mr. Stevenson's position is that he admits the correctness of the principle of the stand-by clause; but he limits its application. It is surely not beyond the wit of a consulting gas engineer to devise safeguards to a gas and electricity stand-by clause, in order that it may have the fullest application where it is necessary, and yet not do injustice to any consumer. Heywood has at all events shown that there is no insuperable difficulty in so doing.—Ed. J.G.L.]

The Engineer and the New Business Man.

Sir,—Having just read the article entitled "The Engineer and the New Business Man," on p. 281 of the "Journal" dated May 2, the "spirit moves me" to write a few lines on the subject for the consideration of your readers.

About sixteen years ago, being then the Engineer of the Norfolk (Virginia) Gas Company, I decided that to increase sales of gas it was necessary to do more than just let people know we had gas to sell, and to give them good service when they applied at the Company's office for a meter. The idea was not at all novel with American—and I believe not with British, French, German, or any other—gas engineers, as, of course, you know it was in vogue at that or even a much earlier date.

But, confining myself to my experience of that day, I beg to submit the following facts: I engaged a young man, formerly a salesman for a clothing house, now assistant-manager of a leading American "Cracker" company, to get "new business"—leaving it to him as to the "how." He did a number of things before and since successfully done nearly everywhere—such as installing gas-cookers in stores and having demonstrators in attendance; advertising in newspapers, and by "scorchers" in the way of handbills, &c. One of his posters had upon it, in large scarlet letters, the words "FIRE! FIRE! FIRE!" and then proceeded to set forth the well-known, even at that time (pardon my saying this), advantages of gas for domestic purposes.

Did he get the business? "Well, you bet he did." He succeeded admirably, being incited by a commission for every new consumer he obtained—a privilege allowed, by the way, to every employee of the Company at the same time. He secured orders where there were gas-mains; and miles from where there were any. And right here it may be stated that if it had been left to this enthusiastic "New Business Man" and not to a hard-headed Board of Directors and to an old-fashioned President of the Gas Company, besides a no doubt (in the salesman's opinion) somewhat slow Engineer, gas-mains galore would have been put down where they would not have paid anything for years to come, but would undoubtedly have lost the Company's money. Still, right here, it may be admitted that may be Mr. C. W. Hare, whom you mention, would have been in his right place, instead of the old fogies who were.

Why would it not be a very good thing to put the purser instead of a captain in charge of a steamship great or small? Such a course would be somewhat analogous to the contention that the "New Business Man"—of whom I have given one illustration—be put in charge of everything about a gas company's plant and business.

It is undoubtedly due to the very sad and monumental ignorance, as well as assumption, that the "New Business Man" and his backers forget themselves as much as they do.

Frederic Egner.

Washington, D.C., May 12, 1911.

Sulphur in Coal Gas.

Sir,—With reference to Mr. Humphrys' critical article on the above subject in the "Journal" for the 16th inst., I may point that gentleman to the only reference in my article to 100 grains of sulphur: "One would not be surprised to find that in poorer provincial companies the amount of sulphur runs up to 100 grains per 100 cubic feet." I for one should not. Beyond this statement, no assertion was either made or implied, but was assumed by Mr. Humphrys "without evidence." As a result of my experimental work, I have on occasions found 80 to 90 grains; and in the figures given in the last number of the "Journal" (p. 511), I see that the maximum found in one London company is 93·7 grains. It is not a big step from that to 100 grains.

Mr. Humphrys says that small works have the advantage in dealing with smaller bulk of gas. So they have; but this is often more than balanced by inefficient plant—plant constructed for dealing with a make of 50 million cubic feet, but in practice having to deal with from 60 to 80 millions.

Further, Mr. Humphrys' reference to the man in the street and his interpretation of grains per cubic foot is, in my opinion, a libel on that individual, and here irrelevant; for one expects, when writing in a technical journal, to be able to employ the accepted technical terms. Your correspondent himself uses them in his own article.

Mr. Humphrys refers to the sentiment of the sulphur question. Is it sentiment which is causing Coventry to spend some thousands of pounds on new purifiers, and go back to lime purification?

May 26, 1911. G. Stanley Cooper, B.Sc., F.C.S.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read a second time and committed: Chasetown Gas Bill, Gas Orders Confirmation Bills (Nos. 1 and 2), Gas and Water Orders Confirmation Bill, Gloucester Corporation Bill, Hornsea Urban District Council Bill.

Bills reported, with amendments: Chapel, Whaley, and District Gas Bill, Chesterfield Gas and Water Board Bill, Gaslight and Coke Company Bill, Rhondda Urban District Council Bill, West Cheshire Water Bill, Wirral Water Bill.

Bills read the third time and passed: Blackburn Corporation Water Bill, Swansea Gas Bill, Tamworth Gas Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Lords Bill read the first time and referred to the Examiners: Swansea Gas Bill.

Bills read a second time and committed: Harrogate Corporation Bill [Lords], Local Government Provisional Order (Gas) Bill.

Lords Bills reported, with amendments: Hastings Corporation (Water and Finance) Bill, Luton Gas Bill, Oystermouth Urban District Council Bill.

The Ashborne Urban District Council have withdrawn their petition against the Ashborne and District Gas Bill [Lords].

LUTON GAS BILL.

The Bill promoted by the Luton Gas Company, to enable them to raise further capital and construct additional works, was on Thursday last before the House of Commons Committee on Unopposed Bills—Mr. Whitley, the Deputy-Chairman of Ways and Means, presiding.

Mr. Lees (of Messrs. Lees and Co., Parliamentary Agents) explained that the Company had been very successful. They were supplying gas at 2s. per 1000 cubic feet; and no complaint had ever been made against them. There was no opposition from the Corporation. It was proposed to raise £100,000 capital, with one-third borrowing powers—£133,000 in all. In addition, they were creating some capital which would not be entitled to dividend; and borrowing on this would make a total available share and loan capital of £172,986. The Company had an authorized share capital of £65,000, and £16,000 loan capital. The Company had applied large sums out of revenue, with the result that the actual expenditure on the undertaking had been £167,000. So that although £65,000 only was authorized, the revenue was actually in excess of the capital which has been subscribed, owing to the fact that the Company, instead of raising capital on which dividends would have to be paid, used their profits in extensions and improvements, and had spent revenue on capital account. Strictly speaking, this was not quite regular; but it has been for the benefit of the consumers. In regard to the consumption of gas, in ten years it had gone up from 226 million cubic feet to 398 millions. The population of the area supplied had increased in ten years from 36,404 to 52,000; the number of consumers from 5554 to 11,400; the largest daily make from 1,040,000 to 1,800,000 cubic feet; the gas-holder storage remained the same—viz., 1,150,000 cubic feet. There should be at least a storage capacity equal to the largest day's make. A new gasholder would therefore be required next year, at a cost of £20,000. It was proposed to spend £182,000 as follows: New carbonizing and purifying plant within two years (this would fill up the existing site), £9000; new site to be bought within two years, £6000; in three or four years, new gas-works to be erected on new site, £65,000; a further new gasholder in six years, £32,000; ten years' extensions of mains, new meters, and stoves, £30,000; and extension of new works within ten years, £20,000. The fact that the Corporation had gone very carefully into the whole matter, and had not seen any ground for opposing, was evidence the estimates had been carefully framed.

Mr. Moon (Speaker's Counsel): What is the expectation as to the demand for gas in ten years?

Mr. *W. Phillips*, the Engineer to the Company, said it was calculated that it would be doubled in ten years.

Mr. Moon said the figures would work out at £600 per million cubic feet on the capital proposed, which was a very low price.

In regard to clause 32, which proposed a minimum charge in cases where a consumer had a separate supply,

The Chairman said such a clause was not put into Gas Bills.

Mr. Lees said where a consumer had suction plant and used the Company's gas as a stand-by, he should pay a minimum charge. Many consumers put in their own suction plants.

The Chairman: Has a case arisen in Luton?

Mr. *Phillips:* We have known cases where there were suction plants, and where gas was laid on. We have lost a very big consumption from these places.

Mr. Lees: We have got to lay the gas on.

Mr. *Phillips:* Yes; and they use our gas to start their engines because it is cheaper.

The Committee allowed the clause to stand. The clause creating capital not entitled to dividend was passed. Other clauses were adjusted; and the Bill was ordered to be reported for third reading.

CUDWORTH GAS BILL.

A Locus Standi Question.

The Bill confirming a Provisional Order made by the Local Government Board conferring certain powers on the Cudworth Urban District Council in relation to their gas undertaking was under the consideration of the Court of Referees of the House of Commons on Tuesday last, on the petition of the Hull and Barnsley Railway Company for *locus standi* to be heard against the Order when before a Select Committee. The Midland Railway Company and the Barnsley Gas Company lodged similar petitions; but they had come to an agreement.

Mr. Moss-Blundell appeared for the petitioners; and Mr. Soutter (of Messrs. Durnford and Co., Parliamentary Agents) represented the Cudworth Urban District Council.

Mr. Moss-Blundell explained that the Bill was for the purpose of confirming the above Provisional Order, by which the Cudworth Urban District Council sought power to purchase certain lands on which to construct works for manufacturing and storing gas and residual products. It was also proposed to confer borrowing powers on the Council for purposes of the Order. The petitioners were the owners of railways and works in the urban district of Cudworth, and were also part owners with the Midland Railway Company of the Cudworth Railway Station. They were large consumers of gas, and also large ratepayers in the district. They contended that the powers sought with reference to the erection of gas-works were wholly unnecessary, and would be the means of throwing a very considerable burden on the rates; thus causing injury to the petitioners by largely increasing the amount of rates payable by them. At the present time, the Council had powers of getting gas in bulk from the Barnsley Gas Company, and could obtain all the gas necessary for the proper supply of the district far more economically than they could by means of separate works set up by themselves. The petitioners therefore submitted that the proposals of the Order were wholly extravagant and unnecessary, and should not be sanctioned. In addition to being large ratepayers, the petitioners were also consumers of gas. At the present time they obtained their supply from the Royston Gas Company; and in respect of Cudworth Station, from the Barnsley Gas Company. If the powers now sought were granted, they would be injuriously affected as consumers of gas, inasmuch as it might interfere with their being able to continue to obtain supplies from the Royston and Barnsley Companies; and this would increase the price of gas supplied by the Council. The petitioners further pointed out that the district was not such a one as would justify a large expenditure of capital in the construction of gas-works, as it was merely a colliery district. Many of the collieries had existed for a long time, and would be worked out before many years had expired. Whenever that happened, a large number of the ratepayers of the district would leave; the rateable value would largely disappear; and this would lead to a disastrous burden on the rates which would have to be provided by the few ratepayers remaining. These would include the only two substantial ratepayers in the district—the Midland Railway Company and the Hull and Barnsley Railway Company—who would have to bear all the expense of this gas undertaking. It was fairly a case for *locus*, because there were undoubtedly exceptional circumstances which it was in such cases necessary to prove. Even as ratepayers they should have *locus*. In 1903, the Local Authority obtained power to supply gas, not to manufacture it, and got their supply from the Barnsley Gas Company. The Hull and Barnsley Railway wrote for a supply; but the reply was that the length of the main was too great. They therefore obtained a supply from the Royston Company at 3s. 4½d. per 1000 cubic feet; and as they consumed gas to the amount of £250 a year, they were large customers. What they apprehended was that the promoters would prevent the Royston Company from supplying them by not allowing them to open up the roads when necessary. The answer of the promoters to this no doubt was that it could be done to-day; but they had not the temptation to do it. There was no limit to what the Council could charge.

Mr. Soutter: There is a limit of 5s.

Mr. Moss-Blundell: Well, that is a serious amount. It would mean another £150 a year.

Mr. Moon (Speaker's Counsel): You cannot petition on behalf of consumers of gas in the district who are going to have their rates increased because you are the only consumers.

Mr. Beale: The only point alleged is that the Bill will make gas dearer.

Mr. Moss-Blundell: A large consumer has before been allowed to petition, even though not appearing in a representative capacity.

Mr. Beale: You say you have such a substantial interest that it is analogous to a representative body?

Mr. Moss-Blundell replied in the affirmative. Answering further questions, he said they proposed to spend £1200 or £1400. This was the cost of the new works.

The Chairman: What is the total income?

Mr. Soutter: About £1900; being the gross receipts from the sale of gas. He then replied to the opening statement on the other side. He said he had to deal with the petitioners in a double capacity, as consumers and ratepayers.

The Chairman: I do not think you need argue the ratepayers' side of the question.

Mr. Soutter: I say as consumers they have no case. How are they to be affected by this Order? They tell us they take their gas from Royston under agreement. There is nothing in the Order which will interfere with this agreement. If this agreement could be interfered with, it would be under the Order of 1903, by which we were constituted the gas authority for the district. They are in the same position as any other consumer; and they can keep on getting gas from Royston so long as they do not interfere with the public roads. They complain that we would not supply them with gas because the main would be too long. This is a very extraordinary statement to make, because, under clause 11 of the Gas-Works' Clauses Act, 1871, any gas consumer can call upon a gas company to supply him with gas. If the supply pipe is more than 30 feet from the gas-main, then the consumer is obliged to enter into an agreement to take the gas for two years, and to pay at the rate of 20 per cent. of the cost of the pipe. They are also compelled to give a guarantee that they will pay the cost of the pipe if they leave off taking the gas at the end of two years. Their position under the Order of 1903 is unaffected; and on this ground I say they have no *locus* against the present Order. They claim as large consumers. I do not think there is any case when a large consumer, as such, has been allowed *locus* unless he can show special circumstances; and the petitioners here have not done this. They say they consume gas to the extent of £200. They are not consumers of our gas, but of somebody else's gas. All the allegations were raised at the local inquiry. They were carefully considered by the Local Government Board, and dismissed. The statement that the coal in the district will soon be worked out is pure fiction. Only the top seam has been touched, and the deep and valuable seams at Cudworth will last hundreds of years. The petitioners have not shown that they are in a position different from that of other consumers. I have no doubt if we get the Order, they will be only too glad to come to us.

The Chairman: Could the Local Authority prevent the Royston Company, as a non-statutory concern, from laying a pipe if anything went wrong with the Hull and Barnsley supply?

Mr. Soutter: Yes; but not under this Order. This would be under the Order of 1903. We could do this to-day. Under the present Order, we do not interfere with them in the slightest degree.

Mr. Moon: I suppose you agree that you could not prevent the Royston Company from continuing to supply gas to the Hull and Barnsley Railway Company unless you were yourselves in a position to supply gas?

Mr. Soutter: We are in a position. We can do it to-morrow.

Mr. Beale: When you gave £1900 as your receipts, at what price was the gas?

Mr. Soutter: 3s. 9d. per 1000 cubic feet. If they wanted protection, they should have sought it under the 1903 Order. They cannot now go back on past legislation.

Mr. Moss-Blundell read the letter of 1904 in which the promoters declined to supply the Hull and Barnsley Company.

The room was then cleared.

On the re-admission of the parties,

The Chairman said: The Committee have carefully considered the case, and have decided, by a majority, to allow the *locus*.

WATER BOARD AND THAMES CONSERVANCY BILLS.

The Joint Committee of the two Houses of Parliament who have had the above-named Bills under consideration, last Wednesday amended the clauses of the Metropolitan Water Board (New Works) Bill in accordance with decisions arrived at in previous sittings. On the question of borrowing powers, it was agreed that the period for repayment of the £4,100,000 loan for works of a permanent character should be sixty years. For the £1,000,000 for capital expenditure within seven years on extensions of mains, &c., the Committee gave borrowing powers, and allowed thirty years as the period for repayment. A number of other amendments were inserted, and the Bills were passed.

Mr. Offord's Evidence on the Enfield Gas Bill.—Mr. C. W. Offord, the General Manager and Secretary of the Enfield Gas Company, referring to the report of his evidence before the Unopposed Bills Committee of the House of Commons in support of his Company's Bill, as given in the "Journal" last week, says it differs in some respects from his actual statements, which were as follows: "During the past twelve years, the quantity of gas sold has increased by over 161 per cent. The capital expended in this period was at the rate of £610 per million cubic feet of the additional gas sold. Assuming that the same rate of increase will still go on, in twelve years' time we shall be supplying a further 350 million cubic feet or more of gas. The capital expenditure necessary to produce this extra quantity, taken at £500 per million cubic feet, would swallow up over £175,000. We are asking in the Bill for further capital powers, including borrowing, of £158,635."

Remarkable Juvenile Slot-Meter Robber.

In the Children's Court at Wrexham on the 15th inst., a boy named William Lloyd, aged 14, was summoned, at the instance of the Wrexham Gas Company, for stealing money from a prepayment gas-meter. The boy did not appear, and a warrant was accordingly issued for his arrest. He was brought before the Magistrates at the Borough Police Court the following Friday, and charged with stealing 3s. from the meter. Mr. T. O. Bury, Solicitor, appeared for the Company, and in the course of his statement of the case he mentioned that, though the accused was not fifteen years of age, he was the tenant of the house in which his father and mother lived. His parents were away about the 24th of April, and the boy was left alone in the house. When they returned, they found the gas-meter had been broken into. An inspector in the service of the Company said he took the reading of the meter and removed the money on Feb. 27, and again after it had been interfered with. There should have been 3s. 1d. in the box, whereas there was only a penny. A police-constable deposed that the accused confessed to him that he had broken open the meter and taken 3s. to buy food, as he "was not going to starve." Witness, however, had ascertained that the boy went and played "banker" with the money. He bore out the statement as to the accused being the tenant of the house in which he lived, and added that he had turned out his father and had gone home one night helplessly intoxicated. He simply lounged about, being too idle to work. Mr. Bury said the boy belonged to the Special Reserve of the Third Battalion of the Royal Welsh Fusiliers, having enlisted last year. The accused pleaded "Guilty," and had nothing to say in his defence. He was bound over in the sum of £5 to be of good behaviour for twelve months.

MISCELLANEOUS NEWS.

BIRMINGHAM GAS PROFITS.

At last Tuesday's Meeting of the Birmingham City Council, some discussion took place upon the presentation of the annual report of the Gas Committee, particulars of which were given in the "JOURNAL" for the 16th inst. (p. 467).

Alderman Sir HALLEWELL ROGERS submitted the report and accounts, and moved the adoption of the Committee's recommendation, that after the June reading of the meters the prices charged for gas should be reduced, and that the meter-rents should be abolished, except in cases where additional meters were required solely for the consumer's own purposes, and in other exceptional instances at the discretion of the Committee. He said the exceptionally good results of the past year's trading, coupled with the fact that there was now not the least doubt that the coal and gas oil required in manufacture during the current year would be secured at more favourable prices than last year, and that the residuals markets were firm, had prompted the Committee to review the present scale of prices for gas. Bearing in mind that a reduction of 1d. pet 1000 cubic feet on the quantity of gas sold last year represented £32,000, it would be realized that the question of revising the price list was complicated. The matter had received full consideration; and the Committee had no hesitation in recommending the reduced and amended scale. The simplification of the present somewhat complicated schedule of prices was, to a large extent, secured by the elimination of the independent prices of gas for heating, and the abolition of one of the prices for motive power; both classes of consumption being now merged into one rate. It was proposed to reduce the price of gas used for lighting, heating, and domestic purposes, on quantities up to a million cubic feet per quarter in one premises by 2d. per 1000 cubic feet on two of the rates, and 3d. on the other. A new system was introduced of charging for each additional million or portion of a million cubic feet at a reduction of from 1s. 9d., by 1d. per 1000 cubic feet, down to a minimum price of 1s. 3d. These rates were subject to the usual discount of 5 per cent. for prompt payment. The lowest net price per 1000 cubic feet would, therefore, be 1s. 2¼d. Experience gained by the Committee since 1909 indicated that there was a wide field for the application of gas for heating purposes, provided some inducement were offered in the way of favourable prices. It was therefore proposed that gas used for both heating purposes and motive power should be classed under one head; the price of 1s. 6d. per 1000 cubic feet to apply to consumptions under a million cubic feet per quarter, with 1d. reduction on each million, down to a minimum of 1s. 3d. per 1000 cubic feet—the prices to be subject to a reduction of 5 per cent. for prompt payment. A similar schedule of prices would apply to gas supplied at high pressure, where such supply was available. He repeated his assurance, given in 1905, that the consumer would receive the full benefit of the reduced prices. The Committee had also great pleasure in recommending what was, in effect, a reduction in price to consumers through prepayment meters. In the aggregate, the proposed reductions represented a considerable sum. But they were so confident the outlook for the future was bright, that they did not consider they had reached anything like finality in the matter of prices; and he would be surprised and disappointed if it were not possible, at no very distant date, to reduce the scale of charges still further. They were fortified in this belief because they were on the eve of important developments in the processes of gas manufacture, which would tend to the cheapening of production. With regard to meter-rents, it had been the practice for some years to impose a quarterly meter-hire charge on meters fixed under certain conditions. The revenue from these small charges was only about £1000 a year; and the Committee felt no useful purpose would be served by continuing the practice. They proposed that in future the rule should only apply to additional meters at the special request of consumers for their own purposes, to register separately a portion of gas used which had already passed through a primary meter, and to other cases which, in the opinion of the Committee, demanded special treatment. He had received from Mr. Arter a note dealing with the gas profits, and questions he intended to raise. Mr. Arter appeared to be anxious to reduce the price of gas to the consumer, and to lessen the amount that was given annually to the rates. As to the principle, it was one which the Council would have to consider sooner or later; but it was a question which had better be left for the enlarged Council. It would hardly be fair to the outside authorities who were coming into Birmingham on the assumption that the trading departments were contributing so much to the rates, to reduce the contribution without allowing them to have a say. Mr. Arter criticized some of the figures in the report. He would remind the Council that an action by a ratepayer was pending against them; and, in the interests of the ratepayers, he did not think these matters should be debated.

Mr. ARTER raised the question whether the gas-consuming ratepayers were treated justly by the department, and what should be the basis of future contributions to the improvement rate. He quoted figures showing that from 1875 to March 31 last the contributions by gas consumers from gas profits had been £4,182,771; being an average for the 36 years of £116,118. The amount for the year ended March 31 was £242,818. The capital expenditure compared with output for 1875 and 1911 was as follows: Capital expenditure for 1875, £2,000,931; output, 2,327,596,800 cubic feet. 1911, capital expenditure, £2,428,461; output, 7,693,899,300 cubic feet. This gave an increase in capital expenditure of £427,530, or 21 per cent.; and in output, of 5,366,302,500 cubic feet, or 230 per cent. It therefore appeared that the consumers, after providing interest on capital, had contributed £4,182,771 to the equipment of the undertaking, and to put it on a sound financial basis, and to assist the rates in various forms. Compared with 25 years ago, there had been a reduction in the price of gas of 7·5 per cent., of which 7·3 per cent. dated from 1906 to 1911. All ratepayers had benefited through their assessments, except those who occupied small houses, and paid rates to their landlords with their rents. Anomalies of considerable magnitude arose, carrying with them injustice. Many small consumers of the artisan class, paying rates indirectly, got no benefit, because landlords obtained the relief from the gas profits out of the rates paid by them. Large consumers often secured small relief from the rates, while small consumers had large relief. As the entire gas area would shortly be within the city boundaries, the time seemed opportune for adjusting anomalies and dividing the benefits fairly, yet giving relief to the rates for the risk (if any) of carrying on this public service. Having regard to the present position of the undertaking, he submitted that the charge for gas should be reduced forthwith to such a price that, after paying the working expenses, including upkeep and repairs, the following items should be provided for: (1) Sinking fund and interest thereon; (2) abandoned plant, buildings, mains, &c., but not excessively or arbitrarily charged; (3) £50,000 per annum to the rates, to include the contributions allocated to public lighting. This would mean that on the profit for 1911 the amount available for decreasing the price of gas would have been £64,186. Incidentally, it might be pointed out that the present method of dealing with the departmental profits had cost since 1875 at least £50,000 for income-tax, which could have been saved to the ratepayers.

Sir HALLEWELL ROGERS, in reply, pointed out that the present was hardly an opportune time to consider alterations of the principles which had hitherto guided them. In the past, the Committee had endeavoured to hold the scales fairly between the consumer on the one side and the ratepayers on the other; but he thought, if any alteration were made, it should be left for the new Council to decide. As regarded Mr. Arter's suggestion that the surplus profit, after paying £50,000 in all to the relief of the rates, should be applied in the following year to decreasing the price of gas, he might say the Committee could not pledge themselves to any such amount. It was possible that during the period of a coal strike the profits might be wiped out entirely. He also reminded the Council that, in accordance with the Consolidation Act, the whole of the surplus profit, after making provision for the actual maintenance of the undertaking, had to be transferred to the improvement rate.

The recommendation of the Committee was agreed to.

Sir HALLEWELL ROGERS then proposed the adoption of the Committee's report, and remarked that, for the first time in the history of the undertaking, the income for the year had exceeded £1,000,000, and was no less than £76,328 more than in the previous year. The sales of gas had yielded an increased income of £40,000, though the average net price for the year was practically ¼d. per 1000 cubic feet less than in the previous year. This was due to the fact that 488 million cubic feet of gas were sold in excess of the previous year's quantity. The income from coke and breeze was nearly £11,000 more; and this was principally due to the increased quantity of coke sold. Tar and ammoniacal liquor yielded increased incomes of £11,769 and £11,097 respectively; and here, again, the larger quantities sold and the higher market prices ruling during the year accounted for the improved results. Repairs, maintenance, and renewal of plant, &c., were £32,000 in excess of the expenditure in 1909-10. This was an item which fluctuated very considerably; and the difference this year was mainly due to the fact that the previous year's expenditure was much below the average. The gross profit was £211,764, and the interest and dividends on Consols made the total £220,707. After deducting various charges, including £12,000 towards the cost of the new offices in the Council House extension, and an extra contribution of £10,000 to the sinking fund, the net balance remaining to be applied in aid of the improvement rate of the city was no less a sum than £75,000—£3000 more than a year ago. It was the largest contribution that had been made to the improvement rate of the city.

The report was adopted.

SMETHWICK CORPORATION GAS DEPARTMENT.

Annual Report—Reductions in Price.

The Secretary of the Gas Department of the Smethwick Corporation (Mr. W. J. Sturges) has presented to the Gas Committee his report on the working of the undertaking in the past financial year, accompanied by the accounts duly certified by the Auditors (Messrs. Carter and Co., of Birmingham).

In the course of his report, Mr. Sturges states that no additional expenditure was debited to the capital account during the year; so that the total on March 31 was the same as at the corresponding period in 1910—viz., £217,048, which is equal to 9s. 6d. per 1000 cubic feet of gas sold, against 10s. 2d. in the preceding year. The total income for the year was £70,385—an increase of £5276 compared with the previous year, and £3836 beyond the previous highest record (1908). The sales of gas exhibit a remarkable recovery from the set-back experienced two years ago; the total revenue derived from this source having amounted to £52,994, compared with £49,581 in the previous year (an increase of £3413), and with £49,783 (increase £3211) three years ago, which was the previous highest record. The improvement is spread in varying degrees over all classes of consumers; the most notable being the revival in the demand for gas for power purposes, which fell off in the period covered by the accounts for 1909 to the extent of 20 million cubic feet, of which some 13 millions have now been recovered. New consumers have been added; and several users of suction plants have also drawn substantially on the town supply. The total quantity of gas sold and accounted for was 458,524,800 cubic feet—an increase of 31,812,000 cubic feet, equal to 7·45 per cent., compared with the previous year. This exceeds the previous highest output by 19,873,100 cubic feet, or 4·5 per cent. The quantity of gas unaccounted for, due to leakage and condensation, was 24,589,200 cubic feet, equal to 5·09 per cent. of the gas sent from the works.

The number of prepayment meter collections during the year was 100,314, against 101,959 before. The average amount per collection was 3s. 5d., against 3s. 1d.; the average amount per meter, 39s. 7d., against 38s. 11d.; the average consumption per meter, 11,875 cubic feet, against 11,675 cubic feet. The number of meters fixed at the end of the year was: Ordinary meters, 3816 (increase 79); prepayment, 8797

(increase 499)—aggregate, 12,613 (increase 578). Number of cooking-stoves fixed on hire, 1806—an increase of 204. There were fixed on the hire-purchase system 51 outside lamps for shop lighting.

In the income from residual products there was a substantial all-round improvement; the total revenue from this source being £17,027, against £15,165 before—an increase of £1862, of which coke and breeze brought £1141, tar £278, and ammoniacal liquor £443. The improvement in coke and tar was due chiefly to the increased quantity produced; but in the case of ammoniacal liquor, while the output was less, there was a very strong market, with prices at figures which had not previously been touched for many years.

The total trading expenditure of the department during the year was £49,553—an increase of £2551, mainly on account of manufacture and distribution. The total charges for the manufacture of gas, including maintenance and renewals of works and plant, show an increase of £2010; but worked out per 1000 cubic feet of gas made, the cost is 1s. 6·876d., against 1s. 7·214d.—a difference equal to £700 in favour of the year. Distribution charges show an increase of £574 in the expenditure for repairs, maintenance and renewals of mains, services, and meters, including the free fixing of services, meters, and stoves; and there is a slight increase in the maintenance of the public lamps. The amount for the public lighting of the borough (gas at 1s. 8d. per 1000 cubic feet, *plus* maintenance expenses), contributed free of charge, rose from £4367 to £4465; and the number of public lamps in use at the end of the year was 1238—an increase of 5.

The gross profit on the year's trading was £20,832, compared with £18,107 for the previous year—an increase of £2725. To the balance of £7108 standing at the credit of the profit and loss account at the commencement of the year has been added the gross profit; and against this has been charged the necessary provision for interest on loans and for the redemption and extinction of the debt on the undertaking, amounting in the aggregate to £10,374; leaving a balance of £10,458 as the net profit, compared with £7403 for the previous year—an increase of £3055. [The net profit for the year ending March 31, 1908, the previous highest, was £10,021.] After deducting the item for public lighting (£4465), contributed by the Gas Committee in aid of the district rate, there remains a balance of £5992 transferred to the credit of the depreciation and extensions fund account; and the profit and loss account closes with £7108 carried forward. The first-named account has been charged with expenditure on account of new exhausters, &c., amounting to £1224, and £880 for the purchase of new meters; leaving a credit balance of £4279 to carry forward towards the cost of the installation of vertical retorts and other extensions in progress.

At the meeting of the Town Council last Tuesday, the Gas Committee recommended that the profit should be allocated as follows: Contribution of public lighting in aid of the district rate, £4465; and transfer to the depreciation and extension account, £5992. They also recommended that after the June quarter the price of gas to consumers taking less than 50,000 cubic feet per quarter should be reduced from 2s. 7d. to 2s. 5d. per 1000 cubic feet, less 5 per cent. discount for prompt payment, and that gas supplied through prepayment meters should be at the rate of 28 cubic feet for 1d., with no discount, or slightly less than 3s. per 1000 cubic feet net—being a reduction equal to more than 2d. per 1000 cubic feet. The Committee also decided to reduce the charges for the hire of cooking-stoves. The recommendations were adopted.

COVENTRY GAS AND WATER DEPARTMENTS.

The Annual Accounts.

The successful management of the Coventry Corporation gas undertaking, under the direction of Mr. Fletcher W. Stevenson, to which reference was recently made in the "JOURNAL," is fully borne out by the annual report just presented to the Gas Committee. It deals with the year ended March 31, and furnishes the following particulars: The total borrowing powers since the acquisition of the undertaking amount, with nominal additions, to £479,805, of which £32,030 has been repaid out of the sinking fund and £5410 temporarily repaid; leaving the present liabilities £442,365. Against these the Corporation have reserve and sinking funds invested or awaiting investment amounting to £72,750; leaving a balance of liability of £369,615. The total amount of capital expenditure since the acquisition of the undertaking is £479,873; but £29,000 has already been set aside towards the loss of capital consequent upon the abandonment of plant at the old works—reducing the total to £450,873. The borrowing powers exercised, less £5410 temporarily repaid, amount to £474,395; so that there is at present in hand £23,522. The total revenue for the year amounted to £145,068. The total expenditure was £104,448; leaving a gross profit of £40,620. To this has to be added the sum brought forward and the bank interest—making the total £41,442. Against this have to be set capital and other charges amounting to £22,058; so that the surplus profit for the year, including the balance from last year, is £19,384; being the highest recorded in the history of the undertaking. The reserve fund at the present time amounts to £9908, of which £8035 is invested in Consols (written-down to the present value), £1438 is on deposit, and £435 is in the current account to be transferred. The Committee are recommending to the Council that the balance of profit of £19,384 should be dealt with as follows: (1) That £4500 be paid over to the general district fund in aid of the rates; (2) that £14,000 be set aside to meet the estimated cost of purifying plant to be erected at the Foleshill works: and (3) that the estimated balance of £884 be carried forward.

The Corporation have reason to congratulate themselves on the very favourable results of the past year's working of the Water Department. Despite the large amount that has to be paid annually to the Birmingham Corporation for the supply of water from the Shustoke reservoir, and extra expenditure in other directions, the accounts for the year ended the 31st of March last show a very substantial profit. During the twelve months, the sum of £3307 was expended on capital account, bringing up the total to £218,121; and the balance of loans outstanding at the close of the year was £156,507. The receipts from water-rents amounted to £26,904, and other receipts to £731; making the total revenue £27,636. The working expenditure came to £13,999; leaving a balance of revenue over working expenses of £13,637. To this has to be added the sum of £1538 brought forward; bringing up the total to £15,175. Capital charges were £7676. The net result, therefore, was a profit of £7499. The Water Committee recommend that this sum should be dealt with as follows: (1) That £4000 be paid to the borough fund in aid of the next two borough rates in equal proportions; (2) that £1615, being the balance of the cost of promoting the Bill of 1907, be paid to the capital fund; and (3) that the balance of £1884 be carried forward.

The Water Engineer (Mr. J. E. Swindlehurst), reporting upon the work of the department, says that during the past year a constant and ample supply of water was maintained throughout the area of supply. A total of 700,928,596 gallons of water were supplied from all sources and distributed to consumers. Compared with the preceding year, this shows a decrease of 16,638,692 gallons distributed, or equal to 2·3 per cent. The total volume represents a daily average consumption of 1,920,352 gallons for all purposes. Based on the population (estimated by the Medical Officer of Health) served at the middle of the financial year (99,483), which includes 483 persons supplied outside the city boundary, the consumption is at the rate of 19·30 gallons per head per diem for all purposes, as compared with 20·69 gallons for the previous year—a decrease of 1·39 gallons. The Engineer points out that the aggregate water supply for domestic purposes, excluding trade supplies, was only about 35,000 gallons per day more during the past year than it was four years ago, notwithstanding the very great increase in population which has taken place during this period. This was accomplished by the systematic inspection carried out by the department, and the general detection and prevention of waste. The portion of the city supply controlled by Deacon's waste-water meters was under constant and systematic inspection during the year; and much useful work was accomplished in the detection and suppression of waste. The Engineer adds that the work of the department continues to proceed in a sound, businesslike way; while the whole of the staff are united in their endeavours to further the best interests of the undertaking.

LEIGH (LANCS.) GAS AND WATER SUPPLY.

Work of the Past Financial Year.

The Engineer and Manager of the Leigh (Lancs.) Gas and Water Works (Mr. James Gibson) has presented to the Gas and Water Committee his ninth annual report, furnishing particulars in regard to the working of the undertakings under their control in the year ended the 31st of March.

The gross profit for the year in the gas department, as shown by the revenue statement, is £12,292; and after deducting sinking fund and interest charges—£9591, equal to 15·68d. per 1000 cubic feet sold—there is a net profit of £2701 notwithstanding the revenue has been diminished by the reduction in the price of gas for street lighting by 5d. per 1000 cubic feet, and to slot-fittings consumers by 3d. per 1000 cubic feet, also a reduction of 3d. per 1000 cubic feet to all consumers for the quarter ending June 30, 1910, compared with the corresponding quarter of 1909. The total amount of these reductions is about £619. In the twelve months covered by the report, 266 houses were provided with penny-in-the-slot fittings. During the year, 401 new gas-services were laid, and 80 defective ones replaced by new. At the beginning of the year, there were on the register 2728 consumers on the ordinary and 5340 on the slot system; but at the end of the year, the numbers were 2705 and 5781—showing a decrease of 23 ordinary, and an increase of 441 slot consumers. The total number of both classes on March 31 was 8486; being an increase of 418, or 5·18 per cent. The number of gas-stoves in use on March 31 was 2474, compared with 2469 on March 31, 1910. The number of incandescent public lamps at the end of the year was 728, or an increase of 302, and of ordinary public lamps 78—a decrease of 288. The total number of lamps on March 31 was 806. Of the 728 incandescent lamps, 630 are fitted with single and 98 with double burners.

The total quantity of gas sent out during the year was 155,402,000 cubic feet; being an increase of 6,073,000 cubic feet, or 4·06 per cent. The quantity sold (including public lighting) was 146,800,300 cubic feet, or 5,080,400 cubic feet (3·58 per cent.) more than before. This gratifying increase in consumption, Mr. Gibson points out, is mainly due to the increased number of prepayment consumers, and also to newly-erected manufacturing premises. At the end of March there were 29 gas-engines connected with the mains; and during the twelve months 2,589,700 cubic feet of gas were sold for power purposes.

The quantity of coal carbonized was 13,580 tons; and, in addition, 4805 gallons of benzol and 2705 gallons of oil were used. The cost of the raw material delivered was 11s. 2·8d. The total bulk of gas produced was 155,402,000 cubic feet, of which 3,795,000 cubic feet was carburetted water gas. The make of coal gas was 11,164 cubic feet per ton; and the average illuminating power was 17·80 candles.

In connection with this portion of his report, Mr. Gibson says that, owing to the continual blocking of the purifiers, caused by the oxide caking-hard on the wooden grids, he has had to reverse the inlet and outlet pipes, in order that the gas should enter in at the top of the purifiers and out at the bottom, instead of, as formerly, in at the bottom and out at the top. This and other experimental methods of working have been tried; and all of them have so far been most successful, giving a higher degree of purification and a reduced cost in working. There are now six clean purifiers in action, as against four clean purifiers formerly. The ultimate economy of this new system of working can scarcely be estimated until a full year's working has been experienced. The make of sulphate of ammonia was 25·40 lbs. per ton of coal carbonized, as compared with 25·32 lbs. per ton for the previous year. The price per ton is the highest obtained during the past ten years. The Leigh Corporation have become members of the Sulphate of Ammonia Committee this year. There is evidently still a wide field

for the use of sulphate of ammonia, especially in this country; and in order to educate the farmers how to use this valuable product, the Sulphate Committee are carrying on a vigorous campaign of propaganda work. The receipts from residuals are higher than last year, chiefly owing to the increased prices of sulphate and tar.

As to the Water Department, there is a loss of £893 on revenue account, compared with £1295 the previous year. The total quantity of water received during the year from the Liverpool Corporation was 242,009,000 gallons, of which 1,043,000 gallons was sold in bulk to the Astley Parish Council. The total average yield was 9·42d. per 1000 gallons. The capital invested in the water undertaking up to March 31 was £62,522; and the expenditure under the Leigh Corporation Act, 1903, to the same date was £20,331.

ST. HELENS v. WIDNES.

Cost of Manufacture and Selling Price of Gas.

In our "Correspondence" columns last week, there was a letter from Mr. Isaac Carr, under the heading "St. Helens *v.* Widnes—Cost of Manufacture and Selling Price of Gas," in which the writer made comparisons in the respects named between the two undertakings. Apparently, Mr. Samuel Glover will not pursue a controversy of this nature with a professional colleague in the pages of the "JOURNAL;" but it is clear that there are certain local features of Mr. Carr's letter which he considered should be referred to in the columns of the St. Helens Press, in view of the fact that the letter from his Widnes *confrère* as appearing in the "JOURNAL" was sent to the "St. Helens Newspaper and Advertiser" for publication.

The following statement of Mr. Glover's comments upon Mr. Carr's letter is made by our local contemporary.

"I do not like newspaper controversies over these matters," said Mr. Glover, when he was seen by our representative with reference to Mr. Carr's letter. "It is often said that figures can be made to prove anything. The policy at St. Helens with regard to the management and control of the Gas Department has been a consistent one. It is still true that circumstances alter cases; and it is impossible in these newspaper controversies to state all the circumstances fully. But one thing I ought to point out. Mr. Carr, in attempting to refute the statement made by the Editor of the "JOURNAL OF GAS LIGHTING," is using last year's figures, whereas the assertion was made on this year's results. The difference in residual products this year over last year is 1·34d. per 1000 cubic feet; and some other differences could be explained."

Mr. Glover added that he had never tried to make gas by paying low wages. He was quite prepared that the wages at St. Helens should be a little more per 1000 cubic feet than they were at Widnes. Moreover, from the figures quoted in Mr. Carr's statement, upon comparison with the standard analyses of gas accounts published by the "Gas World" last year, the revenue from residuals at Widnes is given at 10·07d. per 1000 cubic feet sold, whereas Mr. Carr used the figure 10·254d.—a difference which Mr. Glover could not account for. Without a copy of the Widnes accounts, he could not pretend to go into the figures.

"For instance, in our distributing charges, the cost of fixing meters and stoves, and changing the enormous number of meters and stoves we have in St. Helens is not charged for. Rent-free stoves have provided St. Helens with facilities which stoves give to a very large proportion of the houses in St. Helens, and which entail a cost over and above any difference in stove-rent. I do not know whether Mr. Carr charges himself with water. The St. Helens Gas-Works have got no Water Department to share the cost of management and other expenses."

Mr. Glover pointed out that very likely the fact which the Editor of the "JOURNAL OF GAS LIGHTING" wanted to bring out was that, if the large sum of money, amounting now to nearly £100,000, which has been given in relief of rates since the Corporation took possession of the gas-works had been devoted to reducing the capital account of the works, the total debt outstanding against the Corporation, instead of being £135,000, would have been only £38,000; while the difference in the interest and sinking fund would, of course, have gone towards lessening the expenses of the Gas Department.

"The cost of purification is more in St. Helens," said Mr. Glover, "but the purification is much more thoroughly done here. That is one of several considerations which ought to be taken into consideration by any gas engineer who presumes to criticize his compeers' works. There is also the question of illuminating power, which in St. Helens is kept constant; and the gas is not merely enriched during the few hours of heaviest consumption in the evenings. Of course, all these facts affect the working costs. While not being able to make a correct comparison of all the figures used, the cost of gas into the holder at St. Helens, purified and of the constant illuminating power which it has in St. Helens, as compared with the only available figure for Widnes, as given in the latest edition of the "Gas World" analyses, is slightly less —5·46d., against 5·47d. The £6000 being given in relief of rates this year practically equals 3d. per 1000 cubic feet, which would be a material reduction.

MORECAMBE CORPORATION GAS DEPARTMENT.

The Engineer's Report.

In the last number of the "JOURNAL" (p. 545), the results of the working of the gas undertaking of the Morecambe Corporation in the year ended the 31st of March were briefly recorded. We are now able to give a few additional particulars from the annual report of the Gas Engineer and Manager (Mr. C. Rhodes Armitage), who, it may be remembered, was complimented upon his successful management, which had resulted in increased profit.

During the past year, 7514 tons 10 cwt. of coal were carbonized (an increase of 129 tons) at an average cost of 11s. 2·4d. per ton, compared with 11s. 9·8d. in the preceding year—a decrease of 7·4d. The total quantity of gas made was 89,600,000 cubic feet, against 82,848,000 cubic feet; being an increase of 7·53 per cent. The make per ton was 11,923 cubic feet, or 705 cubic feet more than before. The gas sent from the works was 80,967,800 cubic feet, compared with 75,215,100 cubic feet—an increase of 7·64 per cent. Of the total, 34,584,000 cubic feet was consumed for private lighting, 28,573,900 cubic feet through slot-meters, 13,718,300 cubic feet for cooking and heating, and 4,091,200 cubic feet for public lighting; the unaccounted-for gas being 8·11 per cent. There are now on the books 2122 ordinary and 2430 prepayment consumers—a slight increase. All the public gas-lamps are on the incandescent system. The total net income was £15,921, or £1071 more than before. The net income from residuals was £2806, an increase of £248; the net return being 7s. 5·64d. per ton of coal carbonized, against 6s. 11·13d. per ton before. The net cost of coal delivered on the works was 3s. 8·76d., compared with 4s. 10·7d. in 1909-10. The gross profit, after allowing £153 loss on the public lighting and £63 for bad debts, realized last year was £11,082. After deducting the instalment of the sinking fund, interest, income-tax, &c., amounting in all to £9255, there was left a net profit of £1827, compared with £72 for the preceding year.

PUBLIC LIGHTING IN POTTERIES TOWNS.

Company v. Municipal Charges.

At the Meeting of the Stoke-upon-Trent Federated Council last Thursday, the Highways Committee submitted a recommendation "That for the ensuing year the charges payable to the gas undertakings of Stoke, Fenton, Longton, and Burslem for street lighting shall be at the same rate as the charges now paid to the British Gaslight Company for street lighting in Hanley." Colonel W. W. Dobson, the Chairman of the Committee, strongly urged the Council to confirm the recommendation. By adopting the new scale of charges, he said, they would save £3000 on the estimates. The terms of the Federation Act provided that gas should be supplied at cost price to the consumers; and he felt very strongly that a burden should not be inflicted on the ratepayers that the consumers of gas from the municipally-owned undertakings should benefit. It was particularly unfair to the ratepayers residing in the areas supplied by private enterprise. Mr. Hayward, in seconding the confirmation of the recommendation, said they were paying a sum equal to a rate of 1d. in the pound for public lighting in the areas from which they had a municipal supply in excess of what it cost them for their supply by a private Gas Company. Mr. Sampson Walker, the Vice-Chairman of the Highways Committee, urged that the Council should decide then and there between the two Committees. The Highways Committee had approached the Gas Committee, and the latter had replied that under no circumstances could they concede the demand for cheaper public lighting. The municipal undertakings ought to be able to supply the Corporation at as cheap a rate as the British Gaslight Company did in Hanley. The ratepayers should not be penalized that consumers in some parts of the area should benefit. Mr. Grimwade remarked that under the Federation Act the consumers had already had the price of gas reduced to them enormously—he was told, in the aggregate, by about £12,000. The demand that the Corporation should be supplied at the same rate as they were supplied by private enterprise was absolutely fair. Amendments to refer the matter back, and to defer the consideration of the subject until a Sub-Committee appointed by the Gas Committee had had an opportunity of inquiring into the whole question, were submitted and negatived; and the recommendation of the Highways Committee was confirmed.

SHIPLEY GAS DEPARTMENT.

Report of the Engineer.

The Gas Engineer and Manager of the Shipley Urban District Council (Mr. H. Blakey) has presented to the Gas Committee a report for the year ended March 31. It shows that the quantity of coal carbonized was 16,226 tons, or 374 tons less than in the preceding twelve months; and the make of gas was 175,622,000 cubic feet—an increase of 2,064,000 cubic feet, or 1·19 per cent. The gas sent out was 157,600,152 cubic feet, or 1,917,752 cubic feet (1·23 per cent.) more than in 1909-10. There are now 5225 ordinary and 3469 prepayment consumers on the books—a total of 8694, or an increase of 226. The number of prepayment consumers rose from 1404, with a revenue of £1850, to 3477, with a revenue of £4336, in 1909-10. The gross profit on the working of the undertaking in the past financial year was £15,507. Of this, a sum of £14,768 was required for interest and the instalment of the sinking fund; so that the net profit was £739, compared with a loss in the six preceding years. The gross income from the sale of gas was £32,702; and that from residuals £6821. After deducting labour and expenses, the net income from the latter source was £6470. This gives a net return of 7s. 11·7d. per ton of coal carbonized; making the net cost of the coal delivered upon the works 3s. 4·25d. The net return on residuals per ton of coal carbonized for the previous year was 7s. 6·69d. The tar made per ton of coal carbonized was 11·05 gallons, compared with 10·53 gallons before; the production of ammoniacal liquor being 30·84 gallons, compared with 29·91 gallons. Mr. Blakey says the Council may reasonably look forward to an increased profit during the current year, as he is confident that, when the coke-conveying scheme has been completed, a considerable saving in the carbonizing department will be effected.

Mr. W. T. P. Cunningham has been appointed General Manager for England and Wales of the First Dutch Bog Ore Company, as from June 1 next.

ST. GALL GAS SUPPLY.

We have received from Herr H. Zollikofer, the Engineer and Manager of the St. Gall Corporation Gas-Works, a copy of the report and statement of accounts of the undertaking for the year 1910.

Readers of the "JOURNAL" will remember that the supply of gas to the town of St. Gall is from a works situated 6½ miles away on the shores of Lake Constance. The works are some 820 feet below the general level of the district of supply, and as a result there is a gain of about 6 inches in pressure *en route*. Blowers are, however, provided capable of giving a pressure of 17 inches at the works for forcing the gas through the main, which is 13⅛ inches in diameter, to the town. A description of the new St. Gall works, and the long-distance main connecting them with the district, was given in the "JOURNAL" in 1907 [see Vol. XCIX., p. 227.] A report of investigations on this long-distance gas-main was subsequently made by Dr. Flegner, of Zurich—see "JOURNAL," Vol. XCIX., p. 826.

The report states that, in correspondence with the general condition of trade in the district, there was a falling off in the consumption of gas towards the close of the year. In June, the cellars of a number of the works buildings were flooded owing to the exceptionally high level attained by the water in Lake Constance, and considerable expenditure was incurred in pumping. Owing, however, to the cellars having been constructed in reinforced concrete, no permanent injury to the foundations occurred. A new 4-inch high-pressure main was laid in the course of the year to Wittenbach, about 1½ miles distant, with which township a contract for the supply of gas for 25 years had been concluded.

The make of gas for the year showed an increase of 7·69 per cent. over that for the preceding year. Of the gas made, 10·5 per cent. was water gas. The make of coal gas per ton of coal used was 11,153 cubic feet, which is slightly less than in the preceding year. In the production of carburetted water gas, there were consumed, on the average per 1000 cubic feet of gas made, 37·33 lbs. of coke, and 24·36 lbs. of oil. The consumption of coke in heating the retort-settings amounted to 11·99 per cent. by weight of the coal carbonized. The unaccounted-for gas amounted to only 0·6 per cent. A considerable district in the vicinity of the works is supplied from them, in addition to the town of St. Gall to which the works belong. The price of gas for lighting and cooking purposes was reduced on the 1st of October from 22 to 20 rappen per cubic metre (from 5s. to 4s. 6d. per 1000 cubic feet), and a similar reduction was also made in the price of gas for the supply of gas-engines. A lower return was obtained from coke than in the previous year; but better prices were realized for ammonia, though the market for tar continued to be depressed.

The coal bought consisted as to 72·19 per cent. of Saar coal, and as to the balance of English coal. The amount of English coal used has increased from 17·91 per cent. of the total in 1909 to 27·81 per cent. in the past year. The average net calorific power of the gas made was 584 B.Th.U. per cubic foot. The accounts show that a balance of 395,000 frs. (about £15,800), representing the profit on the year's working, has been transferred to the municipal chest.

BUCKS AND OXON GAS COMPANY, LIMITED.

An Offer for the Undertaking.

A meeting of the first debenture-holders in the Bucks and Oxon Gas Company, Limited, was held at Salisbury House, E.C., last Thursday, to consider a scheme of reconstruction and re-arrangement of the Company, which is now in liquidation. The scheme provided (*inter alia*) for a new Company to be formed by Mr. W. A. Schultz, with a capital of £25,000, and for the old Company's assets to be purchased for certain cash payments, and the issue of £13,390 fully-paid ordinary shares to the Receiver for distribution among the first debenture-holders at the rate of ten £1 shares for every £25 first mortgage debenture held. Mr. G. M. WHITE, the Receiver and Manager for the debenture-holders, presided.

The CHAIRMAN reported that the meeting had been called by order of the Court to consider and vote upon the scheme. It was necessary, in order to obtain the consent of the Court for the scheme to be proceeded with, that it should be approved by a majority of three-fourths of the creditors present and entitled to vote. It would be impossible to obtain this majority, as he had received proxies to the value of £9275 in favour of the scheme and £7375 against it. The votes of those present amounted roughly to £1000, so that the result was a foregone conclusion—the scheme being rejected. Since the meeting had been convened, he had received a cash offer of £12,000 for the whole concern, with an intimation that the figure named was an absolute limit. He proposed, unless a better offer were received within a reasonable time, to accept this offer, and to enter into a provisional contract for sale, subject to the approval of the Court being obtained. The £12,000 in question would enable a dividend of between 4s. and 4s. 6d. in the pound to be paid to the debenture-holders, after making full allowance for costs and other outgoings. He had been carrying on the business for nine months, and had endeavoured, without success, to find a purchaser. The superior mortgagees were now in a position to compel a sale, and to take possession of the Buckingham property. His opinion was that if the scheme fell through, the offer of £12,000 should be accepted within a week. It was a firm one, and the money would be forthcoming immediately.

A DEBENTURE-HOLDER suggested that, as the undertaking had been valued by Mr. Frank Jones at £18,000, possibly Mr. Schultz might make an increase on the £12,000.

Mr. SCHULTZ expressed his willingness to negotiate with the Chairman, with a view to making a better cash offer than £12,000.

It was arranged for a meeting to take place for this purpose.

COAL & COKE HANDLING.

See pages 516-520 of last week's "JOURNAL" for photographs and description of the most Modern

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PRIMITIVA GAS COMPANY OF BUENOS AYRES, LIMITED.

First Year's Working of the Amalgamated Company.

The Annual Meeting of this Company was held on the 16th inst., at River Plate House, E.C.—Mr. A. E. BOWEN in the chair.

The SECRETARY (Mr. J. M. Macmorran) having read the notice convening the meeting,

The CHAIRMAN moved the adoption of the report and accounts, some particulars from which appeared in last week's "JOURNAL" (p. 470). He remarked that the meeting was a little later this year than the Board had hoped to hold it; but there were several good reasons for any little delay that had occurred. This was the first meeting after the amalgamation of the three Companies; and, of course, the amalgamation had entailed an enormous amount of organization and work in connection with it. They could well imagine what a lot of diplomacy and firmness had to be used to get the three staffs, which had been working in opposition for possibly twenty or thirty years (in fact, he thought it was nearly forty years), to quite realize that they now only had to serve one interest—namely, that of the Primitiva Gas Company. Another reason for the delay was that the Secretary, Mr. Macmorran, was sent out to Buenos Ayres in order to assist in the reorganization; and the Directors thought the shareholders would like them to be in a position to give the latest information about the business, to tell them what was done by him on the other side, and to give them his ideas and those of the Board regarding the prospects for the future. In the opinion of the Directors, nearly all the difficulties incident to the re-organization had now been smoothed over. The Retiro works had to be dismantled under the contract with the Municipality, which contract formed the basis of the amalgamation of the three Companies. All this work had already been completed; and the land had now been handed over to the Municipality. The network of mains which constituted the property of the old Primitiva Company had to be joined up with those of the other two Companies. The machinery, as far as was worth while, had to be re-erected at the different works; and all this had to be done without in any way interfering with the service of gas to the consumers, or to the public lighting in Buenos Ayres. Naturally, an immense amount of labour, organization, and concentration was required to effect this; but there were very few complaints from consumers, and the service was never interrupted for a single moment. This spoke volumes for the ability and energy displayed by the officers on the spot. He was pleased to tell them that there was little to trouble about, and that, with Mr. Macmorran's assistance, the Local Committee and the Company's officers had been able to put the whole of the business into proper working order. The Directors hoped, and thought, that the economies which they all expected to obtain from the amalgamation of the three Companies were likely to be forthcoming in the near future. Another point upon which they rather prided themselves was the fact that, notwithstanding that the Municipality of Buenos Ayres naturally required them to give the usual good service of the three Companies during this period of transition, there had been no trouble whatever with them; and the Company's relations with the authorities were perfectly amicable and satisfactory in every way. As was stated in the report, the profits had been prejudiced to a considerable extent—to the tune of over £35,000—by the fact that, owing to the partial failure of the cereal crops in the Plate, outward freights had been very high indeed during the whole period now under review; but it was hoped that good harvests would obtain in the near future, and that things would again become normal, though so far this year there had been little amelioration of the position. No good purpose would be served by making comparisons between the figures of the present balance-sheet and those of the three Companies for the previous year. The conditions were entirely different. The period had, as he had explained, been one of transition; and the Directors were sure that the economies they expected to derive from the amalgamation would come later on. It might suffice to say that the total profits of the three Companies for 1909 were £355,428; whereas the amalgamated Company made a profit in 1910 of £372,912—or (say) an increase of £17,484, which, under the circumstances, he was sure the proprietors would consider perfectly satisfactory. Nor did he think it would serve any good purpose to state what had been spent out of revenue on the up-keep of works and mains, because, owing to the necessity of connecting the Primitiva mains with those of the other two Companies, a very large expenditure was required, as well as a complete reorganization of the distribution department, and all sorts of non-recurrent expenses were incurred. Probably it would be sufficient for the shareholders to know Mr. Macmorran had reported that he was in complete accord with the certificate given by the Engineers—that the works had been maintained in thorough order, that the condition of the properties could hardly be improved upon, and that little further expenditure would be required to keep the works and mains up to the usual first-class standard. He might mention that the capital expenditure last year amounted to £256,000. This would give some idea of the work that had had to be done. The total increase of gas sold during the year was about 8 per cent. The business in cookers, heaters, grillers, and lamps of all kinds continued to expand rapidly; and the Board were very satisfied with the position under this heading. Perhaps the principal item in the report and accounts was the figure of the cost of the amalgamation. In this sum was included the value of the Retiro land and works, which they had to dismantle, because they agreed with the Municipality that they would hand over the land to them free of cost and charge, in exchange for the present definite concession for twenty years. This item totalled a very large sum of money—say, £715,000—which the Directors had decided should be amortized out of profits during the twenty years which the concession has to run. Therefore they had provided £35,000 out of the profits of the year under review. While the machinery and general installations at Retiro were worth a large sum of money as a going concern, they were worth little or nothing when they had to be scrapped; but the Company had utilized at the other works everything thought by the Engineers to be of value. The Board had charged in

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in its action, this Valve exercises greater vigilance over the gas supply than is possible with the most watchful and economical of human attendants. The exceptional economy of gas consumption thus effected, combined with the general efficiency of the apparatus, has resulted in the "SUN" being widely adopted in all classes of households as well as in schools, public institutions, &c., throughout the country.

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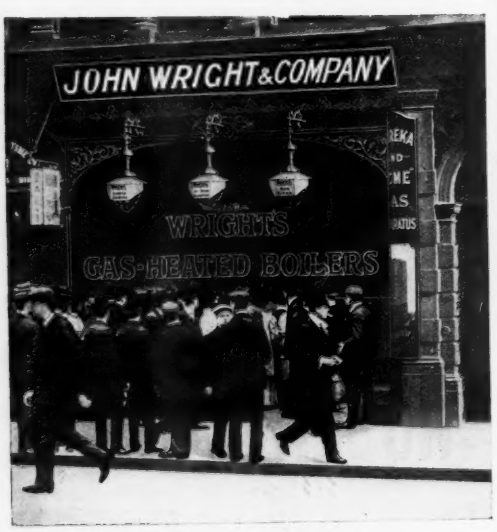

THIS PHOTOGRAPH shows the attention attracted by the "SUN" Boiler, with its Patent Automatic Gas Valve, in our Showroom window at 19 and 21, Queen Victoria Street, London, E.C.

There is an all-day, once-a-minute demonstration of the Thermostat in operation in this window which is both instructive and interesting.

IT IS WORTH A JOURNEY TO SEE THIS.

276

this amount of £715,000 the value of the land, together with the value of the installations, after crediting the account with everything used in the way mentioned. In the balance-sheet of the old Primitiva Company up to the year under review, there was a considerable amount of goodwill included; but this had been done away with, as he would explain. In order that the Directors might know exactly how they stood, they had a thorough revaluation made of the whole of the properties of the Company. In the case of lands, these valuations had been made by sworn valuers; while as regarded the mains and machinery, they found nobody in Buenos Ayres outside their staff competent to make such valuations, so they had them made by their own engineers, who had lived there for many years, and knew exactly what things cost and what they had to do with them. The proprietors might take it from him that the valuations were all of them well within the mark; so that, as far as the Board were able to judge—and it was also the opinion of the Secretary—the large item in the balance-sheet of "lands, buildings, &c., £3,329,230," actually represented value in sovereigns. It only remained for him to explain why it had been decided in future to deduct income-tax from ordinary dividends. They could, by stretching a point, have raised the dividend to 8 per cent. (which they proposed to divide), and have paid the income-tax; but he was certain it was in the best interests of the Company, and therefore of the shareholders, not to do so. The Board had, therefore, fallen in line with what obtained in other large companies connected with the River Plate. The interim dividend was paid free of income-tax; but when this was done the Directors were not in a position to know exactly how the year would turn out, and owing to the work of reorganization going on could not form any very definite opinion as to the future. As far as he was able to judge (and he had been connected with the gas companies of Buenos Ayres for something like thirty years), they had an excellent business—one which was growing rapidly, and was likely to do very well in the future. They had had considerable experience of the electric light in Buenos Ayres—a city eminently suitable for its development—but one could only judge by experience, and he knew that electricity was doing them little or no harm. They had found that there was plenty of room for both methods of lighting; and they did not lay themselves out to compete in any way with the Electric Company, whom they had never found at all hostile to them. Therefore he thought the proprietors could sit tranquilly on their shares; and though he did not hope to give them such a good report as the one they had before them for the first year's working of the amalgamated Company, he had every confidence that the Board would show them something better in the future.

Mr. H. E. JONES seconded the motion.

The CHAIRMAN, replying to questions by several shareholders, said it was obligatory to pay the preference dividends free of income-tax. The reserve fund existing when the Companies were amalgamated had been written off against goodwill and revaluation of land and buildings. What was to become of the Company at the end of the twenty years' concession he could not tell them; but they would have plant and buildings, and if they continued on the present conservative lines they might have a little money as well. It was a great thing for the shareholders to know that they could sit down tranquilly for the next twenty years. For a long time they had been struggling to obtain a concession; and now they had this long period of peace and quietness before them. They were not limited in the amount of money they could place to reserve. They were bound under the concession as to the price of gas; and this fluctuated according to the amount sold. There was no agreement with the Municipality as to what would happen at the end of the concession. They would simply revert to the conditions existing before the concession was granted.

The resolution was carried unanimously.

The CHAIRMAN next moved that the balance of the profit and loss account (£187,744) be divided as follows: For the payment of a final dividend of 5s. per share, less income-tax, making a total distribution of 8 per cent. for the year, on the ordinary shares, £61,250; to the reserve fund, £30,000; to the pension fund, £5000; and to the Retiro works amortization account, £35,000; leaving to be carried forward, £56,494. He pointed out that though they had placed only £30,000 to the reserve fund, they had really provided considerably more, as the £6000 sinking fund of the River Plate and Buenos Ayres (New) Gas Companies debenture stocks was also reserve, the £35,000 for the Retiro amortization account would, of course, if properly invested, more than cover the Retiro item during the twenty years of the present concession, and, in addition, they had redeemed during the year £8300 of the Primitiva debenture stock. So that altogether reserve, in one shape or another, had taken a nice slice out of the profits.

Mr. J. C. IM THURN seconded the motion, which was agreed to.

The retiring Directors (the Chairman and Messrs. C. P. Ogilvie and Ross Pinsent) were then re-appointed, as were also the Auditors (Messrs. George A. Touche and Co.).

Mr. JONES, in proposing the re-election of the Chairman, remarked that they had heard the able statement Mr. Bowen had given them of the difficult and arduous work of the Board and of the Company during the past twelve months, and the graphic way in which he showed that the combination of three entirely independent, and formerly rather hostile, bodies was not a matter that could be accomplished without considerable trouble. The enormous amount of work that had had to be done had been rightly and well carried out. No one who was practically engaged in the gas industry—as he (Mr. Jones) had been all his life—could fail to be impressed with the extraordinary grasp of mind, energy, sense of responsibility, and courage of the Chairman. Companies working abroad did not get an Act of Parliament like an English undertaking, but had from time to time to renew their concessions; and this was exactly what would happen in their own case. There was no danger, provided an undertaking was administered as their Company was, and he hoped would continue to be.

The CHAIRMAN next proposed, as extraordinary resolutions, the election as a Director of Mr. J. D. Pearson, and the requisite alterations to the Articles of Association to enable this to be done. He said that, when the amalgamation was decided upon, provision was inserted in the articles that no additional Directors should be elected until the

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number had been reduced to five. Mr. Sanford, however, who had been connected with the Primitiva Company as long as he (the Chairman) had been interested in the gas business, felt he had done enough work, and wished to retire shortly; but he had found a substitute in a brother of the Chairman of the Local Committee, Mr. S. H. Pearson. Mr. J. D. Pearson had an intimate knowledge of Buenos Ayres, and would be of the greatest assistance to the Company. The resolutions would have to be confirmed at an extraordinary meeting.

Mr. C. H. SANFORD seconded the propositions; and they were unanimously agreed to.

Hearty votes of thanks having been accorded to the staff in London and Buenos Ayres and the Chairman and Directors,

Mr. MACMORRAN, returning thanks on behalf of the staff, said he had recently been at work in Buenos Ayres; and he could assure the shareholders that the managers, engineers, and all the heads of departments were thoroughly imbued with the importance of the undertaking. The value of the land on which the works, &c., stood must greatly appreciate. There was ample room for extensions at a very moderate capital outlay. The amalgamation of the three Companies had entailed a vast amount of reorganization; and it would be some little time before they reaped the full benefit.

The CHAIRMAN also briefly acknowledged the vote.

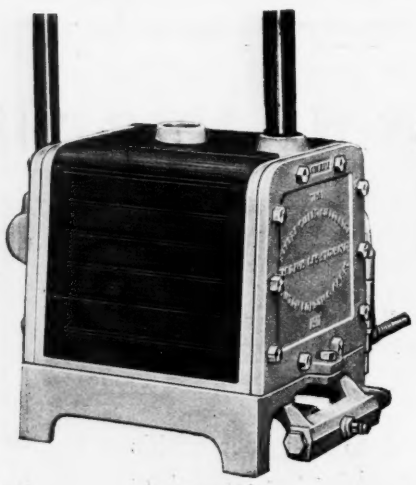
MONTE VIDEO GAS COMPANY, LIMITED.

A Question of Property Expropriation—Labour Unrest.

The Ordinary General Meeting of this Company was held last Thursday, at Winchester House, Old Broad Street, E.C.—Mr. T. C. TATHAM in the chair.

The SECRETARY (Mr. Henry Kearns) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, said if the shareholders would turn to the debit side of the balance-sheet, it would be seen that the first three items—capital account, reserve account, and insurance fund—were unchanged. To reserve for renewals they had again transferred £4000 from profit and loss; and the account now stood at £14,500. He had before mentioned that this reserve would be used for the reconstruction of one of the retort-houses; and last year he stated that, if desirable, they would have it working by April, 1911, which was the commencement of the winter season in Monte Video. At present, beyond obtaining the necessary permits from the Municipality, they had deferred commencing the work, and to this matter he would refer later on. Having alluded to certain small changes in items in the accounts, he said the credit side of the balance-sheet showed that £4884 had been written off for depreciation, and £2576 had been added for the value of the new piping laid during the year and for new meters. The result was that the total capital expenditure was £538,411, against the capital receipts of £570,600. The stocks of coal and materials exhibited an increase of £6293, as compared with the previous year; the chief increase being in coal. But, in connection with this item, the shipments afloat should be taken into consideration, which showed this year a decrease of £4215. The stock of coal was larger; and the cost was heavier, owing to the high freights which had ruled throughout the year; and this would add to the working expenses in the current year. Sundry debtors showed a decrease of £1567, and might be all considered as good debts, as every item which was doubtful had been deducted. The investments showed an increase in the year under review of £3676, due to the expenditure on the erection of the Company's new building, which was used for their offices and show-rooms, and residential flats. The whole building was now occupied, and showed a satisfactory rental upon the amount expended. He did not think there were any further items in the balance-sheet calling for comment; and he would therefore proceed to the revenue account. The receipts from the sale of gas, residual products, meter and stove rental, &c., showed a satisfactory increase of £5209, while the revenue from the dock, workshops, tug, &c., was lower by £1274. Against the net increased revenue of £3935 was the heavier cost of working—£3528—due partly to the larger quantity of coal carbonized to meet the increased sales of gas, to higher freights, and, partly, to the cost of re-sheeting one of the gasholders, the rearrangement of some of the plant and mains, the re-sheeting of one-half of the purifier-house roof, and other work. The net revenue exhibited the small increase of £402; and the balance available for dividend—£31,304—showed an increase of £358. After payment of the dividend, there remained a balance of £12,337 to be carried forward. Now a few words as to the reason why the Directors had postponed commencing the new works, on which a large expenditure would be necessary. They were led to this conclusion because, as he daresay many of the shareholders had noticed, a concession had been granted by the Government of Uruguay to a Syndicate for carrying out what was known as the southern embankment scheme. This scheme, which had been talked about for many years, had materialized since he last addressed the shareholders; and in October last it received the definite assent of the Chamber of Representatives. He also saw from the public Press that matters had so far advanced that a contract had been entered into for the construction of the work. It was proposed to construct the embankment in front of the dock property, which was part and parcel of the gas-works. This dock property was not only used to repair ships in the dock, and for all sorts of business connected therewith, but for the purpose of landing all the coal and materials for the purposes of the gas-works. The Directors had therefore thought it prudent to defer the commencement of the works until they knew more of the details of the scheme, and how they might be affected generally. They were, of course, subject to Uruguayan law in the matter, which provided that private property could be expropriated for public purposes, on payment of compensa-



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tion, which could be settled either by agreement or by arbitration. So far as he knew, no detailed plans had been presented; and therefore at the moment the Directors could not tell exactly what the effect on the Company might be. But the Board would watch over the interests of the shareholders; and they had no reason to suppose that they would be treated other than fairly. The scheme was one which would certainly add immensely to the attractions and amenities of Monte Video. The shareholders would have noticed in the newspapers that a series of agitations and strikes among the workmen of Monte Video had been in progress for a month past; and he had hoped that, as the Company's relations with their workmen were not strained, they might escape the trouble. On Tuesday last, however, he regretted to say, the men employed in the dock department and fittings deparment, the carters, and the street men went out on strike. The cable, however, advised that the men employed in the gas-works were then working. As the Company carried out a public service in Monte Video, it was to be hoped that the gas workers would not join in the strike, and that they would emerge from this trouble without any considerable loss to the Company. He noticed that the railway men had not joined the strike.

Mr. CHARLES HUNT seconded the motion, which was unanimously carried.

Mr. C. C. MALLET inquired when one of the Directors went out last to inspect the Company's property, and to look after their interests generally. He (Mr. Mallet) was at Monte Video last year; and he wished to acknowledge the courtesy he received from the hands of their Manager, who showed him over the property. He saw that, if the Government were going to take away the front of their property, the dock would be of no use at all to the Company; and in the protection of his own interests, he had come to the meeting to ask the Directors to watch very closely this expropriation, and see that the interests of the shareholders were properly looked after.

The CHAIRMAN replied that Mr. Hunt was out in Monte Video for some time four years ago; and thoroughly went over everything. His colleague (Mr. Robert Morton) was out there some years ago; and he (the Chairman) had paid a visit to the city, and thoroughly examined the gas-works. With reference to what might happen in the event of the expropriation of their property, he could not say anything at present. The negotiations might take place here or over there. But anyway, in Monte Video they were represented by an exceedingly capable gentleman in the person of their Manager, Mr. Lane. Whatever was done, the shareholders might rely upon it that there would be no backwardness on the Directors' side of the table to go out if necessary.

The motion was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. JOHN MEWS, a dividend of 8s., less income-tax, was declared; making, with the interim dividend, 3½ per cent. for the year.

Moved by the CHAIRMAN, and seconded by Mr. HUNT, Mr. Mews was re-elected to his seat at the Board; and moved by the CHAIRMAN, and seconded by Mr. MEWS, Mr. Hunt was re-elected.

On the proposition of Mr. R. DEMPSTER, seconded by Mr. MALLET, Mr. George Sneath and Mr. Laurence E. Halsey (of Messrs. Price, Waterhouse, and Co.) were re-appointed Auditors.

The CHAIRMAN, in moving a vote of thanks to the whole of the staff of the Company for their services during the year, said he could truthfully say the Company were energetically served both on this side and on the other.

Mr. HUNT seconded the motion.

Mr. DEMPSTER, in supporting it, said there was one point that struck him about their balance-sheets; and it was that the names of the officials who were working abroad making the money for them did not appear, as was usually the case with companies at home, in conjunction with those of the Directors. There was perhaps nothing much in this; but he thought officials working abroad appreciated the recognition and the compliment. At any rate, he considered that the name of the Manager should be printed on the balance-sheet.

The CHAIRMAN remarked that personally he could see no objection. He thought the omission was merely a custom with their Company.

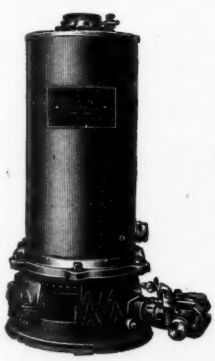
The motion was heartily agreed to.

A vote of thanks was also passed to the Chairman and Directors; and this concluded the proceedings.

GAS MATTERS AT LEEDS.

The accounts of the Leeds Corporation gas undertaking for the past financial year, which were submitted to the Gas Committee last Tuesday, show a highly satisfactory profit.

The total revenue amounts to £383,062, and the expenditure to £271,319—leaving a gross profit of £111,743, compared with £98,321 for the previous year. From this gross profit, the following sums have been paid: Income-tax and interest, £50,420; redemption fund, £40,370; revenue contribution to capital outlay, £260; and provision for repayment of stoves, £2592; leaving a surplus to be transferred to the city fund in aid of the rates of £18,100, as against a surplus profit twelve months ago of £6016. The estimated surplus profit was £14,000. The revenue from gas was £282,813, against £287,470. Considerable economies, however, have been effected in the production of gas; while residuals have furnished a revenue of £95,127, against £84,812. On the expenditure side of the account, as compared with the previous year, the cost of coal decreased by £3586; the average price paid being 9s. 11·3d., per ton, against 9s. 11·9d.. Under the heading of rates and taxes, there is shown an increase of £1002. The amount expended on capital account during the year was £16,218, of which £4696 was for new workshops in Sovereign Street, and the balance principally for mains and meters. The total capital expenditure to March 31 was £1,922,262. During the past year, the net debt on capital account was reduced by £23,422, and now stands at £1,250,102,



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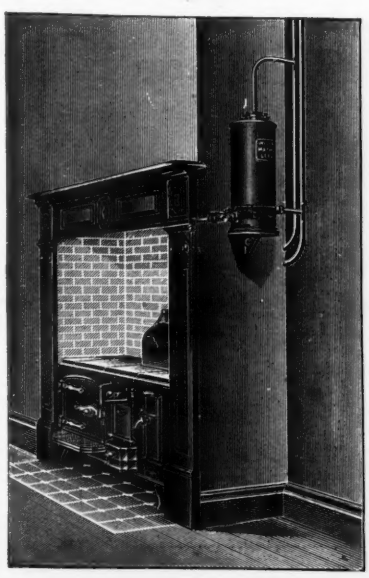

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as compared with £1,365,408 in 1905—a decrease of no less a sum than £115,306.

Efforts are to be made to encourage the use of gas for cooking purposes. At present the Committee let out gas-cookers on the ten years' hire-purchase system, charging 10 per cent. above the list-price. They have now resolved to let out cookers on simple hire, at the cost price to the Committee, with the option of purchase after the user has paid a year's rental. The success elsewhere of high-pressure lighting induced the Committee to put down a trial installation in Leeds; Calverley Street and Duncan Street being chosen for the demonstration. The first section—that in Calverley Street—has now been completed. A compressor has been fixed in the basement of the gas offices in East Parade, and a special high-pressure main laid along Calverley Street. Ten lamps have been fixed; three upon the exterior of the gas offices, and seven in Calverley Street. The latter are fitted with three burners of the inverted type, each of 500-candle power, or 1500 candles per lamp. The installation has so far fulfilled every expectation.

NEW GAS AND WATER WORKS IN JAPAN.

According to the "Board of Trade Journal," a new project for a Hokkaido Gas Company has been instituted by prominent business men in Tokio. The capital is fixed at 3,000,000 yen (£306,250); and during the current year works are to be erected at, and gas supplied to, Hakodate, Otaru, and Sapporo. Government sanction is now being sought for subsequently supplying Asahigawa, Muroran, Kushiro, and Rumoe with gas.

A sum of about £1,000,000 has been voted by the Municipality of Kobe for the extension of the water-works; but the measures to be adopted in order to raise the money have not been determined. The supply is to be taken from the Muko River, about 22 miles north-east of Kobe. Two reservoirs will be constructed on this river, at distances of 19 miles and 17 miles from the city, whence the water will be delivered to filter-beds to the east of Kobe by means of tunnels and pipe-lines. It is expected that the work will occupy twelve years; and that when it is completed a daily supply of 31 gallons per head will be available. Extensions which will cost about a similar amount are also to be carried out for Osaka. In this case, the supply will be taken from the River Yodo. The new works will be situated on the right bank of the river, and will include two intake towers, 22 ft. 6 in. high, 14 filter-beds, and four service reservoirs. The extensions will necessitate the installation of several pumps, boilers, &c.; and it is expected that they will be completed in 1914, when a daily supply of 35 gallons per head will be available.

There are under contract, for erection at the Metz Gas-Works, six furnaces of Dessau verticals, four with eighteen and two with twelve 4-metre retorts—96 retorts in all.

METERS LIMITED.

Curious Story about Unclaimed Dividends.

Alderman John Miles, J.P., of Bolton, presided over the fourteenth annual meeting of Meters Limited, which was held last Tuesday in Manchester. In moving the adoption of the report, a summary of which appeared in the "JOURNAL" for the 16th inst. (p. 479), he said the Directors had received many letters of congratulation from absent shareholders; and he thought they had every reason to be pleased with the position. The year's trading had resulted in a gross profit of £33,706; and the dividends recommended (after payment of 4½ per cent. on the debenture stock) were 5½ per cent. on the preference shares and 6½ per cent. on the ordinary shares. While they were paying a little more to the ordinary shareholders this year, the Directors had their eye on bringing the reserve fund up to £100,000. A sum of £9000 had been added this year; and the fund now stood at £75,000. Since the Company started, they had reduced their debenture liabilities by £21,000, they had spent £42,000 on the up-keep of buildings and machinery, and the plant and buildings had been depreciated by £52,000. Alderman Snape, in seconding, said that, as the Company held 30,000 of the ordinary shares, the reserve fund really amounted to £105,000.

A shareholder called attention to a liability of £415 appearing under the heading of "unclaimed dividends," and asked for an explanation. The Secretary (Mr. A. Manning) said that the sum represented money due to people who had not claimed their dividends. The shareholder considered it very odd that people should neglect drawing dividends due to them. Could not they be reminded of the matter officially? The Secretary said he spoke to one gentleman in reference to his uncalled-for dividend, and received the reply: "You mind your own business and I will mind mine." This was eight years ago; and the gentleman in question had not presented his cheques to this day. In answer to a further question, the Secretary said some of the people to whom dividends were due were known, and others were not.

The report and balance-sheet were adopted, and dividends declared.

LIVERPOOL CORPORATION WATER SUPPLY.

A New Water-Tower.

On the occasion of the annual inspection of the home water-works of the Liverpool Corporation last Tuesday, opportunity was taken to lay the foundation stone of a new water-tower at the east corner of the service reservoir on Woolton Hill. The ceremony was performed by Colonel R. S. Porter, the Chairman of the Water Committee of the Corporation, in the presence of the Lord Mayor and Lady Mayoress (Mr. and Mrs. S. Mason Hutchinson), the Water Engineer (Mr. Joseph Parry, M.Inst.C.E.), and a numerous company. When the

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stone had been declared to have been "well and truly laid," Colonel Porter explained the necessity for the reservoir and tower. He said the top-water level at the Prescot reservoirs was 276 feet above the mean sea-level; and as the force of gravity would not carry the water to any greater height than this, pumping had to be resorted to at two places. The top-water level on Woolton Hill was only 26 feet above that at Prescot; and it followed that the cisterns of houses built on or near the top of the hill could not be supplied from the reservoir. Only a few houses had suffered inconvenience; but it was necessary to provide for them and for future houses on this attractive site. Hence the necessity for pumping the water into a tank 45 feet higher than the reservoir. Supplementary information supplied by Mr. Parry showed that the new tank designed by him will have a capacity of about 10,000 gallons, and be supported by a tower of red sandstone masonry. It will be the highest point of the Liverpool Water-Works within the area of compulsory supply; the top of the tank being at a level of 345 feet above the mean sea-level. The centrifugal pump will be driven by electricity supplied from the Corporation mains.

PORTSMOUTH WATER COMPANY.

The Half-Yearly General Meeting of this Company was held last Thursday—Mr. W. GRANT, J.P., presiding.

The CHAIRMAN, in moving the adoption of the report, noticed in the "JOURNAL" last week (p. 548), referred to various items in the accounts, and said the balance on the profit and loss account had increased by £1653 before paying the interest on the debentures, and after this payment had been made there was an increase of £336. The filtration works were completed and paid for, and were working admirably. They cost £70,000; and this was unproductive expenditure, which meant a charge of £3000 a year to be deducted from the profits. It must be a matter for sincere congratulation that, in spite of the heavy burden of the filtration works in the past two or three years, the statutory dividends had been fully maintained without any difficulty. They all looked forward to a prosperous year, and he hoped the time was not far distant when the Directors would be able to consider the subject of back-dividends, and take some steps towards strengthening the reserve fund. The yearly revenue was growing steadily and most satisfactorily. In conclusion, the Chairman bore testimony to the ability and loyalty of his colleagues on the directorate, and spoke in terms of high commendation of the Secretary (Mr. J. L. Wilkinson), the Engineer (Mr. Herbert Ashley, M.Inst.C.E.), and the other principal members of the staff.

Lieut.-Col. C. L. OWEN seconded the motion; and it was carried unanimously.

The Chairman and Colonel F. Stubington were re-elected Directors, and Mr. E. Edmonds was re-appointed Auditor; and the proceedings closed with a vote of thanks to the Directors.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

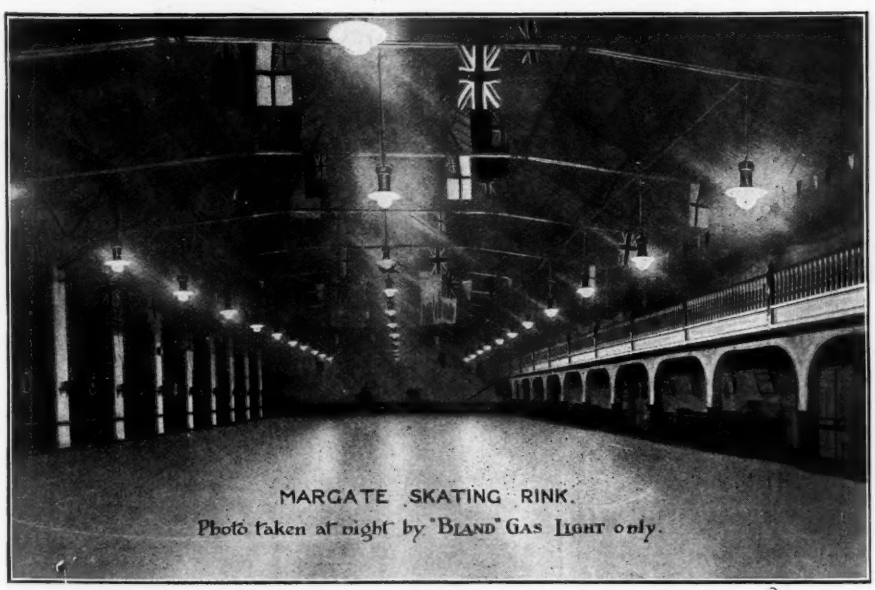
As the date approaches upon which the Institution of Gas Engineers is to meet in Glasgow, the local Press are beginning to take notice of the event. What may be described as a preliminary announcement was, for instance, published in the "Glasgow Herald" on Tuesday of this week. The notice contained, besides a *résumé* of the principal engagements at the gathering, the statement that Professor Bone, in his lecture, would "explain the new method of promoting combustion of gas, whereby it is claimed that about double the heat value is obtained as compared with the present system." It was also intimated that an attendance of between 400 and 500 delegates was promised.

A special meeting of the Town Council of Denny and Dunipace was held on Tuesday, at which Bailie Lochhead, the Convener of the Gas Committee, moved that the Council resolve to supply gas to the districts adjacent to, and lying to the south of, the burgh, including the villages of Dennyloanhead, Longcroft, Hollandbush, and Banknock, and for this purpose resolve to proceed with the works mentioned in a specification prepared by Mr. W. Wilson, of Falkirk. A direct negative was moved to the motion; but the scheme—a somewhat bold one for a place of the size of Denny—was carried by 7 votes to 2.

What may be described as almost the resuscitation of the Buckie Gaslight Company, Limited, was reported to the shareholders at their annual meeting on Thursday. It was stated that the profit for the year had been £316, and that the Directors proposed to pay a dividend of 5 per cent. on the preference and 6 per cent. on the ordinary shares. During the past year, a new gasholder, of a capacity of over 54,000 cubic feet, had been erected by Messrs. Clayton, Son, and Co., Limited, of Leeds, to drawings and specifications prepared by Mr. S. Milne, of Aberdeen. An exhauster had also been installed, the condensers remodelled, and the street mains largely relaid. The Directors were of opinion that the gas-works, in their remodelled condition, were quite capable of meeting the needs of the town. They had also introduced prepayment meters, of which over 70 had been already fitted, and they had orders for about 100 more. This had been the occasion of considerable outlay; but the scheme had been the means of popularizing gas, and the Directors looked for a good return from this source. The issue of £2500 5 per cent. cumulative preference shares was a success; the amount being doubly subscribed—many who were consumers being now shareholders. The Directors' report was adopted.

The breakdown in the electricity supply in Aberdeen, to which I referred last week, has been officially explained, and the explanation is sufficient to make clear the very precarious existence which electric undertakings have; to put it in another way, that there is no more than a paper wall dividing success from failure with them. On Wedneday of this week, the Electrical Engineer reported to the Electricity Committee that the breakdown was due to the three following causes: (1) The drawing of a heavy current to a faulty cable in Union Street

"The Best Lighted Rink in the Country."



MARGATE SKATING RINK.
Photo taken at night by "BLAND" GAS LIGHT only.

By the courtesy of the Isle of Thanet Gas Company, we are able to give the following extract (which speaks for itself) of a letter from the Manager of the Rink.

"I certainly think that it is the best lighted rink in this country, and I know most of the rinks here, and all in America."

(Signed)
HARRY AYNSLEIGH.

"BLAND" BURNERS ARE THE BEST FOR EVERY DESCRIPTION OF LIGHTING.

THE BLAND LIGHT SYNDICATE, LTD..

63, QUEEN VICTORIA STREET, LONDON, E.C., and 20, FENNEL STREET, MANCHESTER.

due to a pickhole in the cable; (2) the overloading of the boiler steaming at the time; and (3), owing to one of the mechanical stokers failing to operate, the steam was reduced to such a degree that it was found necessary to shut down the station until the mechanical stoker could be put right and steam brought up again. Can we, in the wildest flight of imagination, conceive of a gas supply being cut off because a mechanical stoker went out of order?

To keep an eye upon our rivals is a necessity in commercial life; and so we read with interest the remarks of Lord Provost M'Innes Shaw, of Glasgow, as Chairman at the annual meeting the other day of the Broxburn Oil Company, Limited. "At present," he said "it was difficult to forecast any improvement in the prices of liquid products or wax. There was, however, one product which was in a satisfactory position—viz., sulphate of ammonia, of which the Company produced a great quantity. It had advanced in price very considerably, and the larger revenue from this source would this year be of great assistance to the Company. Fortunately, the world's requirements of this fertilizer appeared to be ever on the increase; and the increasing production found a ready sale."

A demonstration was given the other day of a bituminous fuel suction producer gas plant, the invention of Mr. R. V. Farnham. The producer is charged at first with coke, and about two hours afterwards the bottom grate of the producer is raised by a rack arrangement about 18 inches. A sliding-plate is then forced in, which holds the fuel in position, when the bottom grate is lowered to its original position. The space thus cleared is filled with about 300 lbs. of slack coal, the sliding-plate is withdrawn, and the incandescent coke rests upon the newly introduced bituminous fuel. The producer is re-charged at intervals of from two to three hours.

The Water Committee of the Glasgow Town Council have submitted their estimates for the current year, and these have been approved. They provide for a revenue of £254,929, as compared with £243,891 last year; and an expenditure of £242,743, as compared with £237,211 —leaving a surplus of £12,186. The Committee reported that they had had before them a memorial from certain users of water in large quantities for trade purposes, in which the suggestion was made that any further reductions in the rates and charges for water should be in the charges made for the supply of water for trading purposes, and that the Corporation should consider the introduction of a sliding-scale of charges for such water, under which large consumers would obtain a reduction in price in respect of the quantity used by them. The Committee resolved not to entertain the suggestions in the memorial; but they recommended reductions in the charges for water used for trade purposes, for both small and large supplies. The recommendation was agreed to.

Water consumption in Bradford (Pa.) during the year 1910 averaged 117 gallons per inhabitant per day, according to the last annual report of Mr. S. D. Heffner, the Superintendent of the Water Department. The population is about 17,000, and free water is furnished for various municipal purposes.

CURRENT SALES OF GAS PRODUCTS.

[For Table of "Tar Products Prices," see p. 626.]

LIVERPOOL, *May* 27.

Sulphate of Ammonia.

Notwithstanding the fact of May requirements having all been filled, the decline in values during the past week has not become any more rapid; but the market has still continued slowly on its downward course, and the closing quotations are £12 17s. 6d. to £13 per ton f.o.b. Hull, £12 18s. 9d. to £13 1s. 3d. per ton f.o.b. Liverpool, and £13 to £13 2s. 6d. per ton f.o.b. Leith. New orders for prompt shipment abroad have not been plentiful; and the demand for home consumption is now practically at an end. There has been a fair amount of inquiry in the forward position; but the substantial premium required by makers has stood in the way of first-hand business. It is reported, however, that some of the dealers have been taking orders for both this and next year's delivery at prompt prices.

Nitrate of Soda.

This article continues scarce on spot, and values are well maintained at 10s. per cwt. for ordinary and 10s. 3d. for refined quality.

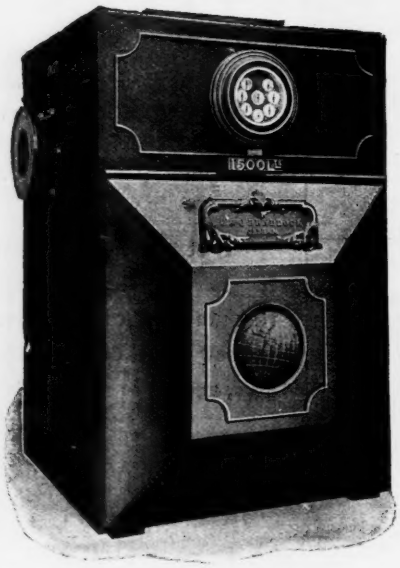
LONDON, *May* 29.

Tar Products.

The markets for tar products have been very steady throughout the past week. There is not very much demand for pitch for prompt delivery, as most of the buyers appear to have covered their requirements. Some business has been done on the east coast at 35s. 6d. to 36s. In London, 36s. to 37s. is asked; but it is doubtful whether this price would be paid. On the west coast, the market is still very firm. Makers say they have very little to sell, and are willing to carry forward unless they can obtain their figures. For next season, the majority of makers ask 37s. 6d. to 38s.; but it is doubtful whether they can obtain this price. Benzols are steady; and at present the increased tax in Paris does not seem to have affected the market. Toluol is in fair demand; but consumers will not pay the prices asked. Solvent naphtha is dull and very difficult to sell. Heavy naphtha is in poor demand. Creosote is steady; and the majority of makers appear to think that there is a better outlook for this article. Cresylic acid is very firm, and good prices are reported to have been offered in the North during the last week. Naphthalene is unchanged. Salts are not in such good demand just now, and doubtless the inquiry will be easy until the winter brings it into demand for fire-lighting purposes.

The average values during the week were: Tar, 18s. to 22s., *ex* works. Pitch, London, 36s. 6d. to 37s.; east coast, 36s. to 36s. 6d.; west coast, Manchester, 35s. 6d. to 36s., Liverpool, 36s. to 36s. 6d., Glasgow 36s. to 36s. 3d. f.a.s. Benzol, 90 per cent., casks included, London and North, 9d. to 9¼d.; 50-90 per cent., casks included, London and North, 8⅜d. to 9¼d. Toluol, casks included, London, 9¾d. to 10d; North, 9¼d. to 9⅜d. Crude naphtha, in bulk, London, 4d. to 4½d.; North, 3¼d. to 3½d.;

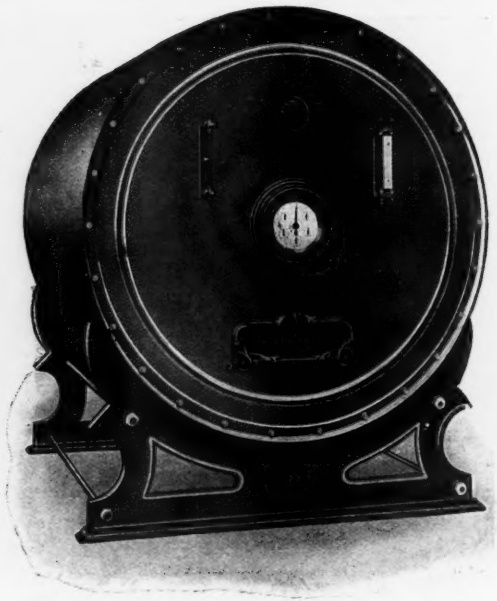
BRADDOCK'S IMPROVED GAS METERS



No. 219. Braddock's Large Dry Meter.

SECOND TO NONE.

Made in all Sizes.



No. 245. Braddock's Large Wet Meter.

J. & J. BRADDOCK (BRANCH OF METERS LIMITED), **Globe Meter Works, OLDHAM,**

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solvent naphtha, casks included, London, 11d. to 11¾d.; North, 10d. to 10½d.; heavy naphtha, casks included, London, 11d. to 11½d; North, 10d. to 10½d. Creosote, in bulk, London, 2½d. to 3⅜d.; North, 1⅝d. to 2⅛d. Heavy oils, in bulk, 2⅜d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 9d. to 1s. 10d.; west coast, 1s. 8d. to 1s. 9d. Naphthalene, £4 10s. to £8 10s.; salts, 45s., bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market closes very quiet indeed for prompt, although there is a fairly firm tone for forward. The Gas Companies have reduced their price 2s. 6d. during the week; and this leaves the price £12 17s. 6d., leaving a corresponding reduction in the price of London £12 7s. 6d. to £12 10s. In Hull, £13 has been accepted for June for one of the best makes. Liverpool ask £13 2s. 6d., but cannot obtain this. Leith ask £13 7s. 6d.; but it is doubtful whether they can even sell at £13 5s. For forward, quotations are 2s. 6d. to 5s. over the prompt prices; and there is a fairly steady tone about the market.

COAL TRADE REPORTS.

Northern Coal Trade.

There has been a quieter tone in the northern coal trade, as far as steam coal is concerned—gas coal holding its own in price. Best Northumbrian steams are in fair demand. There is an ample supply, so that the price has eased to about 10s. 3d. per ton f.o.b., and up to 10s. 6d. Second-class steams are from 9s. to 9s. 3d.; and for steam smalls, from 5s. to 6s. is the current quotation. In the gas coal trade, the demand is active, and the prices retain the improvement shown last week. For best Durham gas coals, about 10s. per ton f.o.b. is now quoted; and for second-class gas coals about 9s. 3d. is the current price. Among the contracts for gas coals that are believed to have been settled is one for a southern port for some 30,000 tons over a year, at a price which is reported to be about 8s. 9d. per ton f.o.b. Some other sales of cargoes are announced at prices slightly higher, according to the period of delivery—good gas coals for prompt delivery being rather scarce, and thus dearer. One of the Belgian gas-works is in the market for 15,000 tons over twelve months. Coke is quiet. Gas coke is fairly steady, at about 14s. to 14s. 3d. per ton f.o.b. for good makes.

Scotch Coal Trade.

Trade is still quiet, and with no appearance of betterment. The Baltic season may bring some improvement. All sorts of coal are plentiful. The prices now quoted are: Ell, 8s. 6d. to 9s. 6d. per ton f.o.b. Glasgow; splint, 9s. 3d. to 9s. 6d.; and steam, 9s. to 9s. 3d. The shipments for the week amounted to 349,138 tons—an increase of 52,726 tons upon the previous week, and of 54,768 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,931,790 tons—a decrease upon the corresponding period of 16,770 tons.

Mersea and District Gas Company, Limited.

A petition that was presented by Mr. J. Armitage Drake and another for the winding-up of this Company was in the list for hearing before Mr. Justice Neville last Tuesday. Counsel asked that the petition might stand over for a month, as negotiations were in progress between the Company and petitioners with a view to a settlement. Mr. Ashton Cross, who appeared for the petitioners, not opposing, his Lordship ordered the petition to stand over for a month.

Sale of Stocks and Shares.

At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards conducted a sale of stocks and shares which included new issues of capital by order of the Directors of the Wandsworth and Putney Gas Company. The first lots consisted of £13,000 of ordinary "C" stock, part of the amount authorized by the Company's Act of 1900; and it ranks for a standard dividend of 3½ per cent., subject to the sliding-scale. In view, however, of the recent reduction in the selling price of gas, a dividend of £5 17s. 3d. per cent. per annum is authorized in respect of the current half year. It was all sold at £120 10s. to £122 per £100. The next lots were an issue of 3 per cent. debenture stock by the Company; and it fetched £75 per £100. On the same occasion, a few fully-paid original £10 shares in the West Kent Gas Company, carrying 10 per cent. dividend, were sold at £20 5s. each; some fully-paid additional shares, of like nominal value, in the Yorktown and Blackwater Gas Company, carrying £8 11s. 6d. per cent. dividend, at £16 10s. and £16 15s. apiece; and (by order of Trustees) some fully-paid £10 original shares in the East Kent Water Company, carrying 4½ per cent. dividend, at £10 10s. each.

The Barnstaple Hotel Fire.—At the meeting of the Barnstaple Town Council on Monday last week, the Lighting Committee reported with regard to the recent fire and explosion at the Imperial Hotel. Mr. H. Barrett said it had been freely stated that the cause was the fusing of the electric wires; but the Council's Engineer (Mr. J. W. Hadfield) made an examination, and was satisfied the explosion was not due to that. No electrical defect was found. Mr. C. A. Youings (of the Imperial Hotel) said all he knew was that the electric light went out, and there was a serious explosion. The Mayor said the explosion was one of those mysteries they could not understand. A few days afterwards, in Plymouth, a gas explosion occurred in a place where he was given to understand there was no electricity. He was also told that gas would explode, under certain atmospheric conditions, with no light whatever; and he could only add electricity would not.

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St. David's Water and Gas Company.

Last Friday, Mr. Justice Neville heard a debenture-holder's action in connection with this Company, which came before him for judgment in default of defence. The Company was incorporated in June, 1889, for the purpose of supplying St. David's with gas and water; the nominal capital being £15,000. The Company had power to obtain money on mortgage to the extent of £4000; and by Statute they were afterwards authorized to borrow a further £9600. The debentures, which charged the whole undertaking of the Company, bore interest at the rate of 4 per cent.; and plaintiff was the holder of 24 debentures, the interest on which was in arrear. As the security was in jeopardy, he asked for the appointment of a Receiver. His Lordship granted the request, and made the usual order in a debenture-holder's action.

St. Petersburg Water Company's Capital.

A petition asking the Court to confirm resolutions for the reduction of the capital of the City of St. Petersburg New Water-Works Company, Limited, came before Mr. Justice Neville last Friday. The Company was formed in 1874, with a capital of £200,000 in £20 shares, to supply water to the City of St. Petersburg, and to purchase and acquire any grants or concessions relating to the supply. The works were carried on profitably for some years. In 1892, the City Council exercised the option contained in the concession to purchase the works, in consideration of the payment of a yearly sum during the remainder of the concession; and this sum had been duly paid. Out of the payments so made the entire debenture debt had been discharged. In 1895 and 1899, the Courts sanctioned a reduction of capital, so that it stood at £110,000, in £11 shares. It was now proposed to reduce it to £80,000 in £8 shares; the reduction being effected by returning to the holders of the shares capital to the extent of £3 per share. His Lordship sanctioned the reduction.

Quality of the Swanage Water Supply.

There has lately been an agitation in regard to the quality of the water supplied to Swanage by the local Gas and Water Company; and it culminated in an application by the Urban District Council to the Magistrates in Petty Sessions on the 20th inst. for an order for the compulsory closing of two suspected wells—one in the town (No. 1) and the other (No. 4) about half a mile to the south of it. The proceedings took place in the Town Hall, which was crowded by all classes of the inhabitants. Mr. A. Macmorran, K.C., and Mr. Hawke appeared for the Council; and the Company were represented by Mr. Clavell Salter, K.C., and Mr. Cecil E. Fitch. After a consultation between Counsel, Mr. Macmorran announced that the parties had agreed to the following terms: That the supply from well No. 1 should be discontinued altogether, and an order be made by the Court to this effect. The closing of the well (the one principally complained of) was absolute and without qualification. With regard to well No. 4, the summons would be withdrawn by the Council upon the Company undertaking forthwith to procure a water supply from other sources, such as would enable them to discontinue altogether the supply from the well. Mr. Clavell Salter said that since 1897 the Directors of the Company had spent £20,000 in searching for a further supply of water supplementary to the Ulwell wells; and they were advised by Mr. Eaton—a water engineer of the highest reputation—that it would be necessary ultimately to go a considerable distance to obtain an absolutely ample permanent supply, from the base of the chalk hills. The Bench acceded to the application, and made the order, by consent, in regard to No. 1 well, and allowed the second summons to be withdrawn.

Malta and Mediterranean Gas Company, Limited.—The Directors report that for the year ended the 31st of March the balance of the general revenue account is £6565. They recommend the payment of the usual dividends on the first and second preference capital, and a dividend of 4 per cent., free of income-tax, on the ordinary capital, making, with the interim dividend paid in December, 6 per cent. for the year, and leaving a balance of £1663 to be carried forward.

South-West Suburban Water Company.—In the report of the Directors of this Company for the half year ended the 31st of March they state that the gross income shows an increase, compared with the corresponding period of last year, of £767, and the maintenance and management expenses an increase of £128. A balance of £10,153 is available for distribution to the holders of the original shares; and the Directors recommend a dividend at the rate of 6½ per cent. per annum, carrying forward £6253, compared with £4904 for the corresponding period of last year.

Convictions for Stealing Gas.—At the Old Street Police Court, a few days ago, William Evans, a meat porter, and Richard Dennis, a carman, occupying tenements in Queen's Square Buildings, Bethnal Green, where the Gaslight and Coke Company have put in prepayment meters and fittings, were charged with stealing gas. The quantities surreptitiously consumed were 12,450 and 9225 cubic feet respectively; the value being £2 2s. 3d. and £1 12s. 1d. Both the accused pleaded "Guilty;" and a fine of £5, or one month's imprisonment, was imposed in each case.

Improved Gas Lighting at Shot-Tower Wharf.—The Westminster City Council have entered into arrangements with the South Metropolitan Gas Company for improving the lighting of Shot-Tower Wharf. The yard and jetty are at present lighted by thirteen flat-flame burners; the annual cost of lighting and maintenance being £44 2s. 7d. The Company offered to replace these burners with seven inverted incandescent gas-lamps of 450-candle power each at an initial cost of £32 4s. 5d., and to clean the lamps weekly and provide mantles, &c., for the sum of 32s. per quarter. The Assistant City Engineer estimated that the annual cost of the seven lamps for lighting and maintenance will be £36. The proposed lamps will have an aggregate of 3150-candle power; that of the flat-flame burners being 325 candles. The offer of the Company has been accepted, subject to their undertaking to maintain each lamp at not less than 450-candle power.

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Lecture on Hot-Water Work.—An audience of foremen and fitters of the Gaslight and Coke Company assembled at the Company's premises in Mare Street, Hackney, on Monday last week, to hear a second lecture on hot-water work; an invitation having been sent to Mr. Frederick Dye (Messrs. John Wright and Co.) to deliver it. As on the previous occasion, there was a very large gathering; and much interest was displayed in the lecture.

South African Lighting Association, Limited.—In the report which the Directors of the Association will present at the ordinary general meeting to-morrow, they state that the working in the year ended the 31st of December resulted in an increased profit compared with the preceding year, notwithstanding a further decrease in the sale of gas. The good result recorded was brought about by a reduction in the expenses. The Directors recommend a final dividend of 4 per cent., making 7 per cent. for the year, free of income-tax. This will increase the amount to be carried forward by £454. The balance on the profit and loss account, including £367 brought forward, is £7121. An interim dividend of 3 per cent. was paid in October, amounting to £2700; and leaving available a sum of £4421. As the final dividend will amount to £3600, there will remain £821 to be carried forward.

Liverpool Gas-Fittings Company Taken Over by the Gas Company.—After negotiations extending over some six months, the Liverpool United Gas Company have decided to take over, as from the 1st of July next, the business of the Liverpool Gas-Fittings Company, Limited. This step is merely a return to the state of things which existed some 35 years ago. The Gas Company, who moved to their present premises in Duke Street about the year 1868, at one time provided their own fittings for customers. But in 1876, after the disastrous fire at the Landing-Stage, it was felt that this branch of the business could more conveniently be carried on as a separate concern; and accordingly they sold their stock-in-trade to a newly-formed firm (which adopted the title of the Liverpool Gas-Fittings Company), and allowed them to use a portion of their extensive building. Now the Gas Company have decided to revert to the former arrangement; and at a meeting held last Wednesday, it was decided to take over the stock of the Fittings Company on the date mentioned, and conduct the business with their own staff.

Coalville Gas Supply.—At the Coalville Urban District Council Chamber last Tuesday, Mr. W. O. E. Meade-King, M.Inst.C.E., conducted an inquiry on behalf of the Local Government Board relative to an application by the Council for authority to borrow £5000 for extensions at the gas-works. Mr. T. E. Jesson (the Clerk to the Council) said the works were purchased by arbitration from the Coalville and Whitwick Gas Company in 1899, and a loan of £47,500 was raised for the purpose. It was subsequently found that further capital expenditure was necessary, and £6000 was obtained from the rates. The price of gas when the works were purchased was 4s. 7d. per 1000 cubic feet, and at the present time it was 3s. 9d. It was anticipated that a greatly increased consumption would result from the recent reduction of 5d., and therefore the enlargement of the works was necessary. Mr. J. W. Eagles (the Gas Manager) said the present annual output of the works was 25,541,000 cubic feet, against 13,679,000 cubic feet at the time they were purchased. They were now working to the full capacity of the plant, which the proposed extension would enable them to double. Last year the profit on the works was £2747.

APPLICATIONS FOR LETTERS PATENT.

11,653.—Hutchins, T. W. S., "Separating tar, &c., from gases." May 15.
11,727.—Anderson, D., "Controlling cocks and switches." May 15.
11,767.—Eshelby, G. H. S., "Incandescent burners." May 16.
11,776.—Frame, W. J., "Blowers or exhausters." May 16.
11,792.—Stringer, G. E., jun., "Conveying or transporting coke." May 16.
11,817-8.—Humphrey, H. A., "Raising or forcing liquids." May 16.
11,851.—Mertens, A., "Automatic gas-analyzer." May 16.
11,869.—Foster, W. H., "Valves." May 17.
11,895.—Wilde, P. R., "Treating products of combustion." May 17.
11,904.—Müller, A., "Mantles." May 17.
11,914.—Clark, W., "Prepayment meters." A communication from E. F. M. Knauer, E. K. P. Haas, L. J. E. Weichelt, F. E. Haas, C. L. Haas, C. Elster, and J. Elster, trading as Gasmesserfabrik Mainz Elster and Co. May 17.
11,921.—Lentschat, G., "Inverted gas-lamp." May 17.
11,929.—Sprague, W. S., and Chamberlain and Hookham, Ltd., "Prepayment mechanism." May 17.
11,940.—Vickers, Ltd., and Imrie, J., "Treatment of producer gases." May 17.
12,017.—Collins, P. D., "Gas shades." May 18.
12,039.—Evans, T., "Nipple for gas." May 18.
12,052.—Ewart, J. W., "Water-heaters." May 18.
12,055.—Humphrey, H. A., "Raising or forcing liquids." May 18.
12,083.—Fletcher, Russell, and Co., Ltd., and Fletcher, T. W., "Top-frames of gas-cooking stoves." May 19.
12,119.—Lessing, R., "Treating porous refractory materials so as to render them gas-tight or increase their refractoriness or density." May 19.
12,186.—Annis, T., "Gas-compressor." May 20.
12,213.—Patrick, H. W., "Acetylene generators." May 20.
12,215.—Akt.-Ges. für Selas-Beleuchtung, "Incandescent gas-lamps." May 20.
12,227.—Burkheiser, K., "Converting sulphide of ammonia into sulphate of ammonia." May 20.
12,228.—Defoy, A. A., "Regenerator for furnaces." May 20.
12,237.—Nicholls, F. J., and Bluckler, M. B., "Mantles." May 20.
12,241.—Friesen, R., "Gas-cocks." May 20.
12,251.—Koppers, H., "Separating and regenerating washing oils used for separating benzol from gases." May 20.

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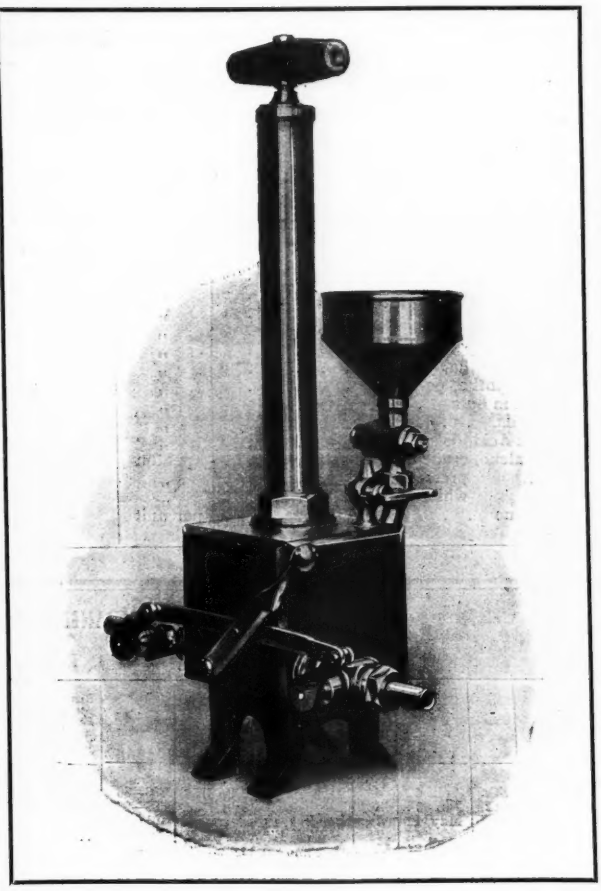

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Telephone Nos. { 3289 (City) Manchester. 2025 (Central) Nottingham.

Wires { "Sawer Manchester." "Sawer Nottingham."

New Joint-Stock Companies Registered.—The firm of Messrs. J. Marse and Co., of Imperial Buildings, Ludgate Circus, E.C., has just been registered as a limited liability Company, with a capital of £1000, in £1 shares, to carry on the business of gas and general engineers. The Keighley Gas and Oil Engine Company, Limited, has been registered with a capital of £50,000, in £1 shares (30,000 preference) to take over the business of manufacturers of, and dealers in, gas, oil, and spirit engines and suction-gas plants carried on at Midland Works and Alexandra Works, Keighley, as the Keighley Gas and Oil Engine Company, and to adopt a certain agreement.

The East Cowes Gas Company have placed contracts with Messrs. Edward Cockey and Sons, Limited, of Frome, for purifiers, oxide shed, &c. Messrs. Cockey have also secured contracts for supplying the Midsomer Norton Gas Company with a scrubber, and their patent tar extractor; also purifiers, valves, and connections.

The Stamford and St. Martin's (Stamford Baron) Gaslight and Coke Company have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for four purifiers 14 feet square, worked by a 12-inch Weck valve, complete with lifting apparatus, &c. The purifier covers are to be fitted with "Green's" patent leak detector. The work has to be carried out to plans and specification prepared by, and under the supervision of, Mr. H. Green, the Manager of the Company.

A girl, named M'Kearnon, fifteen years of age, who was in service at Liverpool, was found insensible in her bedroom, which was full of gas. The tap was half turned on, and a towel was lying at the bottom of the door. All efforts to restore animation unhappily failed. At the inquest, it was stated that deceased had always been of a cheerful disposition, though she was mentally rather dull and was occasionally absent-minded. On two occasions she told her mother she had inadvertently turned the gas on after extinguishing it. A verdict of "Death by misadventure" was agreed upon.

At an inquiry held at Huddersfield into the circumstances attending the death of Peter Mullin, a stoker employed at the gas-works, it was stated that, while deceased was wheeling a barrow of coke, he slipped and fell over the lid of a manhole. The foreman stoker said he understood the man fell on his side on to a large piece of coke which was lying on the floor. The evidence of the infirmary doctor was to the effect that, when he examined deceased on the day of the accident, there were signs of a distinct fracture of one of his ribs on the right side; but there was nothing to show that the lung had been penetrated. Subsequently Mullins again went to the infirmary; and he was then suffering from difficulty of breathing. There were also evidences of pleurisy and of dilation of the heart; but the latter complaint was of some standing, and was due to chronic bronchitis. The Coroner said the immediate cause of death was the fractured rib; and the Jury returned a verdict that death was due to injury caused by the fall.

TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending May 27. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

Article.	Basis.	London.	North-East Coast.	East Coast, Yorks.	West Coast.		Glasgow.
					Liverpool.	Manchester.	
Tar crude	per ton	—	18/6 21/6	18/6 22/-	18/6 21/-	18/9 21/3	—
Pitch	"	37/6 38/-	36/-	36/-	36/6	35/9	36/-
Benzol, 90%	per gallon	—	-/9	-/9	-/9¼	-/9	-/9
Benzol, 50-90%	"	—	-/9¼ -/9¼	-/9¼	-/8 -/8¼	-/8⅜	—
Toluol, 90%	"	-/10¼	-/9⅜ -/10	-/10	-/10	-/10	-/10
Crude naphtha, 30%	"	—	-/3⅜	-/4	-/3¼ -/3⅜	-/3½	—
Light oil, 50%	"	—	-/3⅜	-/3¾ -/4	-/3 -/3⅜	-/3½ -/3¼	—
Solvent naphtha, 90-160	"	—	-/10	-/10	-/10	-/10½	-/11
Heavy naphtha, 90-190	"	—	-/11	-/11⅛	-/11¼	-/11¼	-/11
Creosote in bulk	"	-/2½	-/2⅛	-/2	-/2⅛	-/2 1/16 -/2⅛	-/1⅞
Heavy oils	"	—	-/2½ -/2⅝	-/2¼	-/2¾	-/2⅞	-/2⅝
Carbolic Acid, 60's	"	—	1/8 1/8⅛	1/9	1/7	1/7¼	1/8
Naphthalene, crude drained salts	per ton	—	42/6 45/-	40/- 42/6	47/6	47/6 50/-	—
" pressed	"	—	60/-	63/-	60/-	60/- 72/6	—
" whizzed	"	—	—	—	70/- 72/6	60/- 75/-	62/-
Anthracene	per unit	-/2	-/1⅛	-/1½	-/1¼	-/1¼	—

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 580.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Apl. 12	5	Alliance & Dublin Ord.	83—86	..	5 16 3
374,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	95—97	..	4 2 6
200,000	5	May 12	7	Bombay, Ltd.	6¼—6⅜*	..	5 3 8
40,000	5	"	7	Do. New, £4 paid	5¼—5⅜*	..	4 17 5
50,000	10	Feb. 24	15	Bourne- mouth Gas & Water: 10 p.c.	28—29	..	5 3 5
311,810	10	"	7	B 7 p.c.	16—16½	..	4 4 10
75,000	10	"	6	Pref. 6 p.c.	14¼—15	..	4 0 0
380,000	Stk.	"	12½	Brentford Consolidated	257—262	..	4 15 5
330,000	"	"	9½	Do. New	202—207	+2	4 11 9
50,000	"	"	5	Do. 5 p.c. Pref.	122—124	..	4 0 8
206,250	"	Dec. 15	4	Do. 4 p.c. Deb.	99—101	..	3 19 3
220,000	Stk.	Mar. 10	11	Brighton & Hove Orig.	217—220	..	5 0 0
246,320	"	"	8	Do. A Ord. Stk.	157—160	..	5 0 0
490,000	20	Apl. 12	11½	British	43¾—44½	..	5 5 7
120,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. Stk.	96—98	..	4 1 8
109,000	"	Feb. 10	6	Bromley, A 5 p.c.	116—118	..	5 1 8
165,700	"	"	4½	Do. B 3½ p.c.	87—89	..	5 1 2
82,278	"	"	5½	Do. C 5 p.c.	106—108	..	5 1 10
55,000	"	Dec. 30	3½	Do. 3½ p.c. Deb.	84—86	..	4 1 5
250,000	Stk.	"	4	Buenos Ayres 4 p.c. Deb.	97—99	+1	4 0 10
100,000	10	—	—	Cape Town & Dis., Ltd.	3—4	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	6—6½	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	—	..	—
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	88—90	..	5 0 0
157,150	Stk.	Feb. 24	5	Chester 5 p.c. Ord.	109—111	..	4 10 1
1,513,280	Stk.	"	5/9/4	Commercial 4 p.c. Stk.	114—116	+½	4 14 3
560,000	"	"	5½	Do. 3½ p.c. do.	108—110	..	4 16 11
475,000	"	Dec. 15	3	Do. 3 p.c. Deb. Stk.	77—79	..	3 15 11
800,000	Stk.	"	4	Continental Union, Ltd.	95—97	..	4 2 6
200,000	"	"	7	Do. 7 p.c. Pref.	136—138	..	5 1 5
492,270	Stk.	—	5½	Derby Con. Stk.	122—124	..	4 8 9
55,000	"	—	4	Do. Deb. Stk.	104—105	..	3 16 2
148,995	"	Apl. 12	5	East Hull 5 p.c. Ord.	—	..	—
840,150	10	Jan. 27	10	European, Ltd.	19—20	..	5 0 0
16,179,445	Stk.	Feb. 24	4⅜	Gas-light and Coke: 4 p.c. Ord.	105½—106½	−½	4 7 10
2,600,000	"	"	3½	3½ p.c. max.	85—87	..	4 0 6
4,062,235	"	"	4	4 p.c. Con. Pref.	102—104	..	3 16 11
4,531,705	"	Dec. 15	3	3 p.c. Con. Deb.	79½—81½	..	3 13 7
258,740	Stk.	Mar. 10	5	Hastings & St. L. 3½ p.c.	95—97	..	5 3 1
82,500	"	"	6½	Do. do. 5 p.c.	—	..	—
70,000	10	Apl. 27	11	Hongkong & China, Ltd.	17—17½	..	6 5 8
131,000	Stk.	Mar. 10	7⅜	Ilford A and C	146—149	..	4 19 0
65,780	"	"	5½	Do. B	115—117	..	5 0 5
65,500	"	Dec. 30	4	Do. 4 p.c. Deb.	96—98	..	4 1 8

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
4,940,000	Stk.	May 12	9	Imperial Continental	186—188*	..	4 15 9
1,235,000	Stk.	Feb. 10	3½	Do. 3½ p.c. Deb. Red.	92—94	..	3 14 6
200,242	Stk.	Mar. 10	6	Lea Bridge Ord. 5 p.c.	119—121	..	4 19 2
561,000	Stk.	Feb. 24	10	Liverpool United A.	214—216	..	4 12 7
718,100	"	"	7	Do. B.	163—165	..	4 4 10
306,083	"	Dec. 30	4	Do. Deb. Stk.	102¼—104½	..	3 16 7
75,000	5	Dec. 15	6	Malta & Mediterranean	4⅝—5	..	6 0 0
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	100—102	..	4 18 0
250,000	100	"	4½	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	Nov. 11	3½	Monte Video, Ltd.	13—13½	..	5 3 8
1,775,892	Stk.	Feb. 24	4⅜	Newc'tle&G'tesh'd Con.	102½—103½	+½	4 4 6
529,705	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	89—90	..	3 17 9
55,940	10	Mar. 10	7	North Middlesex 7 p.c.	14½—15½	..	4 10 4
300,000	Stk.	Apl. 27	8	Oriental, Ltd.	137—139	+1	5 15 1
60,000	5	Apl. 12	8	Ottoman, Ltd.	6⅞—7¼	..	5 10 4
31,800	53	Feb. 24	13	Portsea Island A	135—140	..	4 18 4
60,000	50	"	13	Do. B	—	..	—
100,000	50	"	12	Do. C	120—125	..	4 16 0
114,800	50	"	10	Do. D and E.	—	..	—
398,490	5	Oct. 28	8†	Primitiva Ord.	7⅞—8	−⅛	5 0 0
796,980	5	Dec. 30	5	Do. 5 p.c. Pref.	5⅞—5⅞	..	4 9 11
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	98½—100½	+½	3 19 7
312,650	Stk.	Dec. 30	4	River Plate 4 p.c. Deb.	97—99	+1	4 0 10
250,000	10	Mar. 24	9	San Paulo, Ltd.	18—20	+2	4 16 0
115,000	10	"	6	Do. 6 p.c. Pref.	12—12½	..	4 18 0
125,000	50	Jan. 3	5	Do. 5 p.c. Deb.	50—51	..	4 4 5
135,000	Stk.	Mar. 24	10	Sheffield A	235—237	..	4 4 9
209,984	"	"	10	Do. B	235—237	..	4 4 9
523,500	"	"	10	Do. C	234—236	..	6 0 0
70,000	10	Oct. 14	6	South African	9—10	..	4 10 3
6,429,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	119—121	..	3 13 7
1,895,445	"	Jan. 13	3	Do. 3 p.c. Deb.	79½—81½	..	5 2 7
209,820	Stk.	Mar. 10	8	South Shields Con. Stk.	154—156	..	4 13 6
605,000	Stk.	Feb. 24	5⅜	S'th Suburb'n Ord. 5 p.c.	119—121	..	4 3 4
60,000	"	"	5	Do. 5 p.c. Pref.	118—120	..	4 0 0
117,058	"	Jan. 13	5	Do. 5 p.c. Deb. Stk.	123—125	..	4 6 11
502,310	Stk.	May 12	5	Southampton Ord.	109—111*	..	4 13 4
120,000	Stk.	Feb. 10	7	Tottenham and B 3½ p.c.	147—150	..	4 12 10
483,940	"	"	5½	A 5 p.c.	116⅞—118⅞	..	4 0 0
149,470	"	Dec. 15	4	Edmonton 4 p.c. Deb.	98—100	..	8 8 6
182,380	10	Dec. 30	8	Tuscan, Ltd.	9—9½	..	5 0 0
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	98—100	..	4 5 6
236,476	Stk.	Feb. 24	5	Tynemouth, 5 p.c. max.	115—117	..	4 14 5
255,636	Stk.	Feb. 24	6¾	Wands- worth B 3½ p.c.	141—143	..	4 5 6
85,766	"	Dec. 30	3	3 p.c. Deb. Stk.	73—75	..	

Prices marked * are "Ex. div." † Next dividend will be at this rate.